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ABSTRACT

This document contains the materials required to present two courses that were developed during a project to increase the recruitment/retention of women in technical education programs. Presented first is Developing Mechanical/Electrical Aptitude, a 30-hour course to improve students' (primarily women's) mechanical and electrical aptitude and thereby prepare them for enrollment and employment in nontraditional fields by training them to do the following: solve abstract reasoning problems in spatial relations; identify various types of household and industrial tools used and demonstrate their uses; describe mechanical advantages, classes of levers, and simple machines; and understand basic electrical and mechanical concepts and their applications in everyday life. A course overview is provided along with a course test and five modules containing an overview, study/activity guide, instructor information, learning activities, and handouts. Presented next is a Equity/Equality, a course module that can be incorporated into instructional programs or used alone and that is designed to familiarize students with their rights and responsibilities in school and the workplace. The module includes goals/objectives, learning activities, and an evaluation activity and discusses the following topics: legal requirements for equal opportunity in education and employment; prohibited forms of discrimination and harassment and the legal consequences for employers and individuals; and gender equity. (MN)

ED 395 199

Sex Equity:
Recruitment and Retention of Non-Traditional Students

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Project #12-440-150-204
Sex Equity In-Service

Two courses were developed under this project: "Developing Mechanical/Electrical Aptitude" and "Equity/Equality."

The "Developing Mechanical/Electrical Aptitude" is a 30 hour course designed to improve a student's (primarily women's) mechanical and electrical aptitude in order to eliminate barriers to enrollment and employment in non-traditional fields. Upon completion of the course, the student should be able to solve abstract reasoning problems in spatial relations; identify various types of tools used in the home and industry and demonstrate their uses; describe mechanical advantage, classes of levers and simple machines; and understand basic electrical and mechanical concepts and how they are applied in everyday life.

The "Equity/Equality" course module can be incorporated into instructional programs or used for stand-alone presentations. The course provides information on the legal requirements for equal opportunity in education and employment; prohibited forms of discrimination and harassment and the legal consequences for employers and individuals; and gender equity. The course is intended to familiarize the student with his/her rights and responsibilities in the world of education and work in order to be more effective as an employee and a students.

Developing Mechanical/Electrical Aptitude

Table of Contents

Introduction iii
Course Overview iv

Module 1, Abstract Reasoning
Module Overview 1-1
Activity Guide 1-2
Instructor Information 1-3
Abstract Reasoning Handout 1-4
Abstract Reasoning Handout 1-5

Module 2, Spatial Relations
Module Overview 2-1
Study Guide 2-2
Instructor Information 2-3
Handout 1: Activity 2 2-4
Activity 2: Pattern Master 1 2-5
Activity 2: Pattern Master 2 2-6
Activity 2: Pattern Master 3 2-7
Activity 2: Pattern Master 4 2-8
Handout 2: Activity 2 2-9
Activity 2: Pattern Master 5 2-10
Activity 2: Pattern Master 6 2-11
Activity 2: Pattern Master 7 2-12
Activity 2: Pattern Master 8 2-13
Activity 3: Spatial Relations Worksheet 1 2-14
Activity 3: Pattern Master 9 2-15
Activity 3: Pattern Master 10 2-16
Activity 3: Pattern Master 11 2-17
Activity 3: Pattern Master 12 2-18
Activity 3: Spatial Relations Worksheet 2 2-19
Activity 3: Pattern Master 13 2-20
Activity 3: Pattern Master 14 2-21
Activity 3: Pattern Master 15 2-22
Activity 3: Pattern Master 16 2-23

Module 3, Hand Tools
Module Overview 3-1
Study Guide 3-2
Instructor Information 3-3
Assignment 1, Individual Classroom Presentation 3-4
Electrical Tools Lab 1 3-5
Carpentry Hand Tool Lab 2 3-7
Carpentry Hand Tool Lab 3 3-9

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Module 4, Mechanical Advantage

Module Overview 4-1
Activity Guide 4-2
Instructor Information Machines We Use and How They Work 4-3
Handout 1 Six Basic or Simple Machines 4-4
Handout 2—Labeling of Triangles 4-5
Worksheet 1 4-6
Worksheet 2 4-7
Worksheet 3 4-8
Worksheet 4 4-9
Worksheet 5 4-10
Worksheet 6 4-11
Lab 1—Levers 4-12
Lab 2: Inclined Plane 4-14
The Screw 4-15
Examples of the Wheel and Axle 4-16
Circles: Circumference (C), Diameter (D), Radius (R) 4-17
Lab 4—Pulleys 4-19
Part II: Pulleys 4-20
Pulleys and Pulley Systems 4-21
Lab 5—Gears 4-22

Module 5, Basic Electricity

Module Overview 5-1
Activity Guide 5-3
Instructor Information 5-4
Electrical Lab Worksheet 1, The VOM and Its Use 5-5
Electrical Lab Worksheet 2, The VOM and Its Use 5-19
Ohm's Law Worksheet 5-14
Safety First 5-16
Safety Guidelines 5-20

Module 6, Electrical Wiring

Module Overview 6-1
Activity Guide 6-3
Instructor Information 6-4

Appendix

Electrical/Electronic Aptitude Test

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Introduction

The Developing Aptitude Sex Equity Project was developed as the result of Fox Valley Technical College instructors' comments on students' lack of electrical and mechanical aptitude and a request from a local industry to develop a course that would enable female employees to move into nontraditional jobs. This project was designed to measure a student's mechanical and electrical aptitude prior to, and after, 30 hours of instruction in mechanical and electrical concepts.

An advisory committee of representatives from local industries was established to help provide guidelines for the implementation of the project. Female employees from several industries were interviewed to see if they would be interested in taking the course and their suggestions for course content was requested.

In February 1991, thirty-seven women were assessed in mechanical reasoning, abstract reasoning, spatial relations and electrical knowledge. The first three tests came from *Form V, Differential Aptitude Tests* by Bennett, Seashore and Wesman. The electrical test was written by the electronics' instructors at Fox Valley Technical College and can be found in the appendix.

Two class sessions per week were conducted, one session in the evening and a repeat session in the morning. We found, through discussions with employers, prospective students and the advisory committee, that offering the class on the evening/morning schedule provided the needed flexibility for those who had work schedules. This option eliminated the barriers that would otherwise have prevented many students from participating in the project.

Following 30 hours of instruction, the students were reassessed using the same tests; in all areas a significant improvement was shown.

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Course Overview

Competency Upon completion of this course, the student should be able to:

- Solve abstract reasoning and spatial relations problems.
- Identify various types of tools used in the home and industry and demonstrate their uses.
- Describe mechanical advantage, classes of levers and simple machines.
- Understand basic electrical and mechanical concepts and how they are applied in our everyday life.

Time: 30 hours

Introduction: This course is designed to increase the student's mechanical and electrical aptitude through 30 hours of instruction, thereby eliminating artificial barriers for students to non-traditional programs and employment.

Outline:

1. Pre-Test
2. Abstract Reasoning
3. Spatial Relations
4. Hand Tools
5. Mechanical Advantage
6. Basic Electricity
7. Basic Electrical Wiring
8. Post Test

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Module Overview

Task

Solve problems that are presented in nonverbal form involving relative position, sequence, shapes and quantities.

Estimated Time:

1 hour

Outline:

1. Definition ofAbstract Reasoning
2. Problem-Solving Techniques
3. Problem-Solving Group Activities

Performance Objectives

The student will be able to:

1. Define abstract reasoning.
2. Describe problem-solving techniques related to abstract reasoning.
3. Demonstrate the ability to solve problems presented in nonverbal forms.

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Activity Guide

Completed ✓		Learning Activities and Resources
_____	1. Attend	Class lecture and discussion on abstract reasoning and problem-solving techniques.
_____	2. Participate	Class abstract reasoning problem-solving activities using Abstract Reasoning Handout.
_____	3. Complete	Abstract reasoning worksheet.

Instructor Information

Equipment:

1. Overhead projector
2. Overhead transparencies. Master copies included in this guide.

Learning Materials:

1. Copies of abstract reasoning handout and worksheet. A master copy is included in this guide.

Activity 1: Class Lecture and Discussion

In this activity, the instructor shall define abstract reasoning and how the ability to solve problems presented in nonverbal form relate to home and work. The instructor shall describe and demonstrate various problem-solving techniques.

Activity 2: Group Problem-Solving Activity

Distribute abstract reasoning handout to class participants. The instructor should lead a class discussion on the student's solutions using overhead of Abstract Reasoning Handout. Instructor should explain the type of problem and the steps to reach a solution.

Activity 3:

Distribute abstract reasoning handout worksheet to class participants. Students should be directed to solve each of the problems on their own. Upon the students' completion of the worksheet, the instructor should lead a class discussion on the students' solutions.

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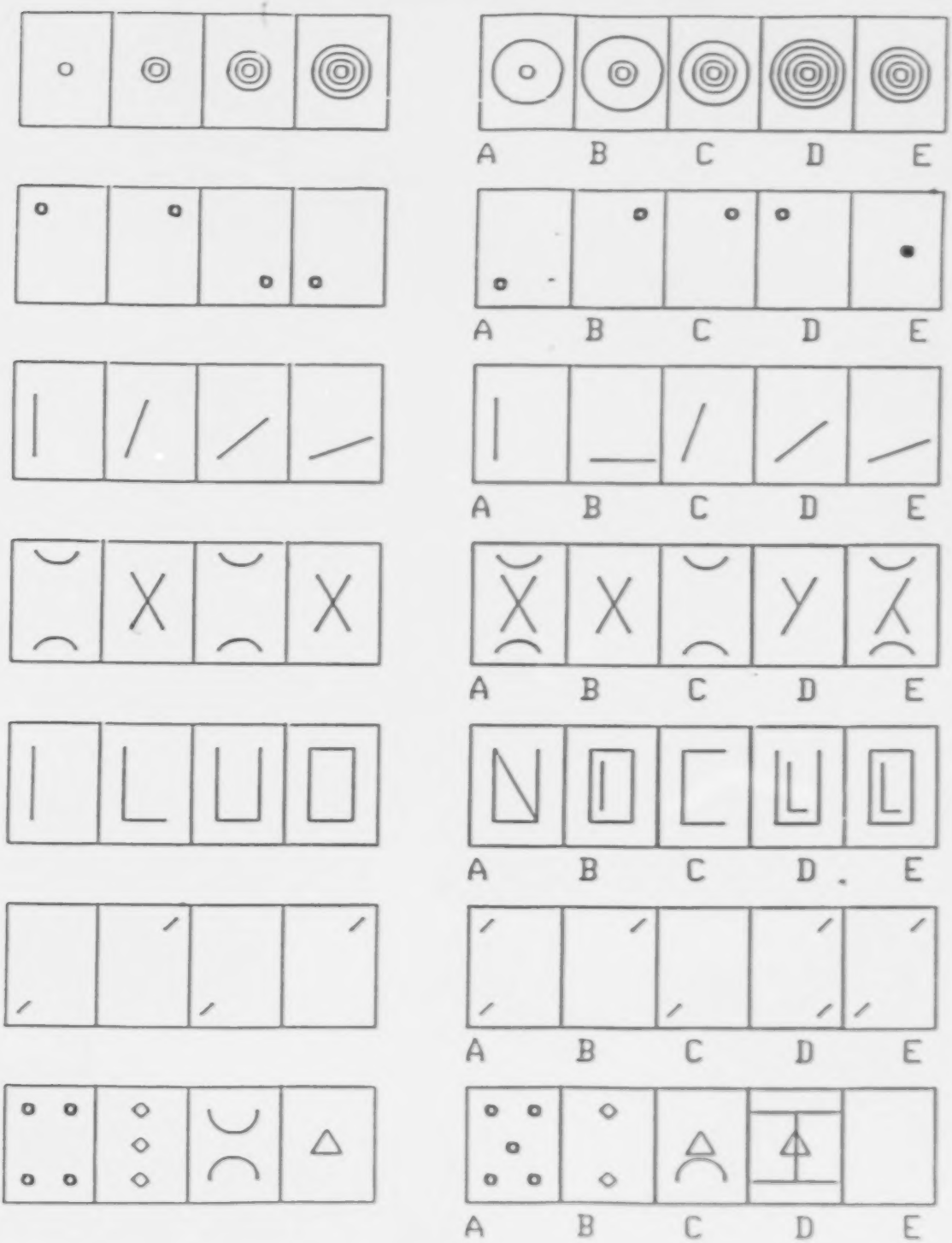
Abstract Reasoning Handout



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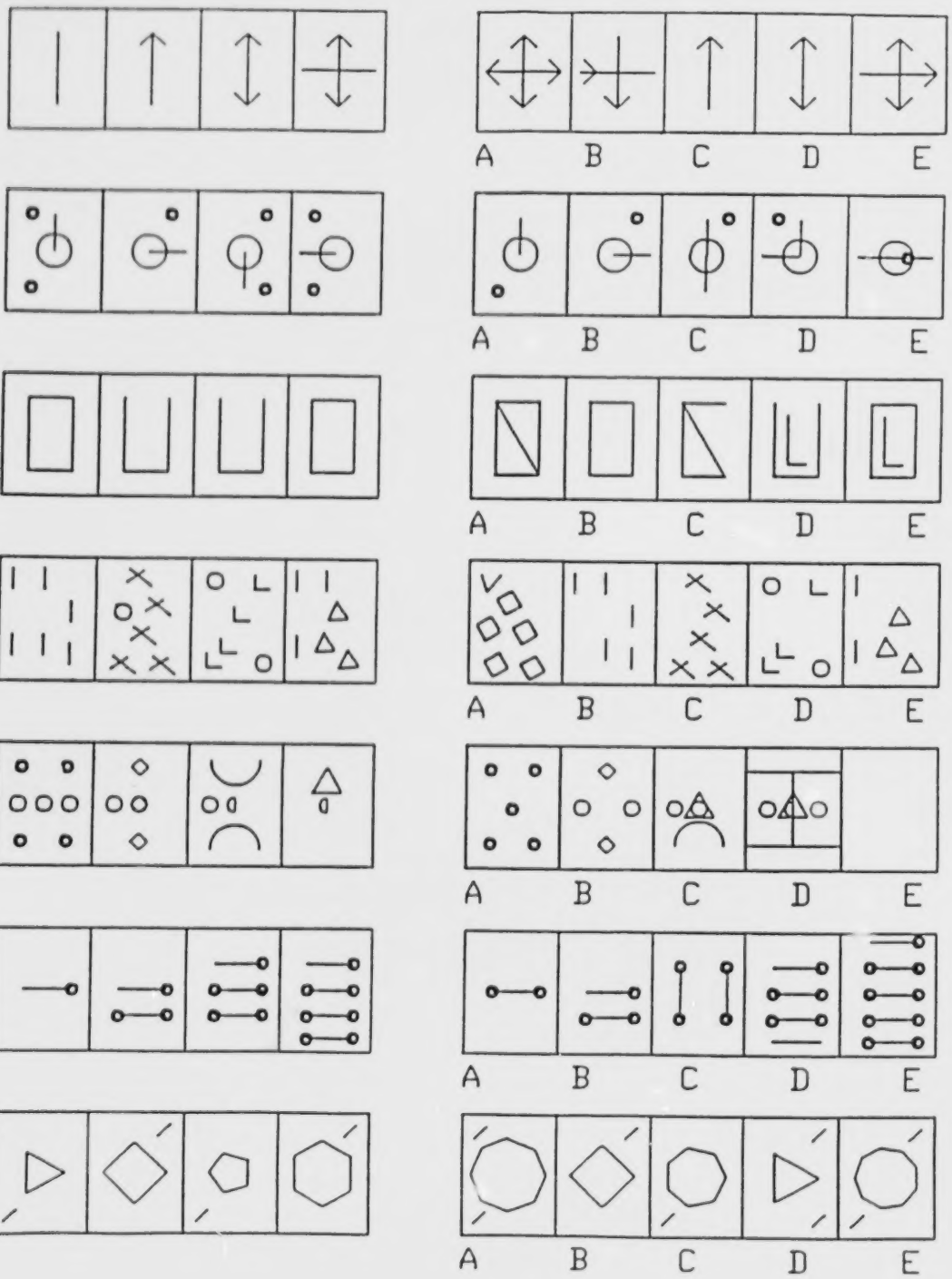
Abstract Reasoning Worksheet



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Module Overview

Task: Solve problems that are presented as spatial relation patterns.

Estimated Time: 1 hour

Outline:

1. Definition of Spatial Relations
2. Problem-Solving Techniques
3. Problem-Solving Group Activities

Performance Objectives

The student will be able to:

1. Define spatial relations.
2. Describe problem-solving techniques related to spatial relations.
3. Demonstrate the ability to solve spatial relations problems.

Study Guide

Completed ✓		Learning Activities and Resources
_____	1. Attend	Class lecture and discussion on spatial relations.
_____	2. Participate	Class spatial relations problem-solving activities using Handouts 1 and 2 and Pattern Masters 1-8.
_____	3. Complete	Spatial relations worksheets 1 and 2 and Pattern Masters 9-16.

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Instructor Information

Equipment:

1. Overhead projector
2. Scissors for each student.
3. Tape.

Learning Materials:

1. Overhead transparencies.
2. Cardstock copies of each pattern.
3. Handouts and worksheet.

Activity 1:

In this activity, the instructor will define spatial relations and describe how these may be used in practical applications. The instructor will demonstrate various spatial relations and problem-solving techniques.

Activity 2:

Using overheads, the instructor shall lead discussion on incorporating problem-solving techniques for each problem presented. Students will construct each pattern from the cardstock handouts. This allows students to manipulate the pattern and look at it in three-dimensional form.

Activity 3:

Distribute Spatial Relations Worksheets 1 and 2. Students should be directed to solve each of the problems on their own. When the students have completed the worksheets, the instructor should lead a class discussion on the students' solutions. Students should be directed to construct each pattern to verify the solution is correct. More patterns may be added at the instructor's discretion.

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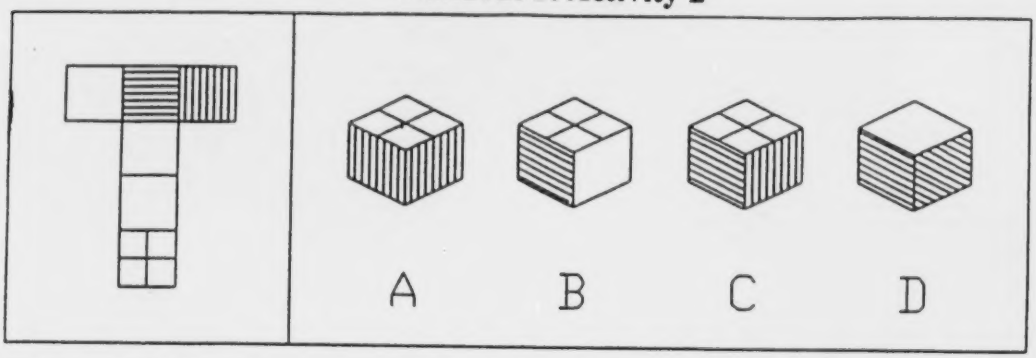
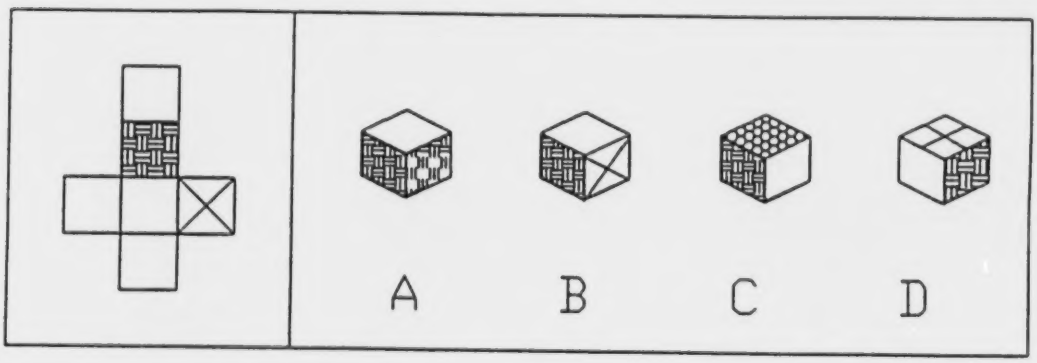
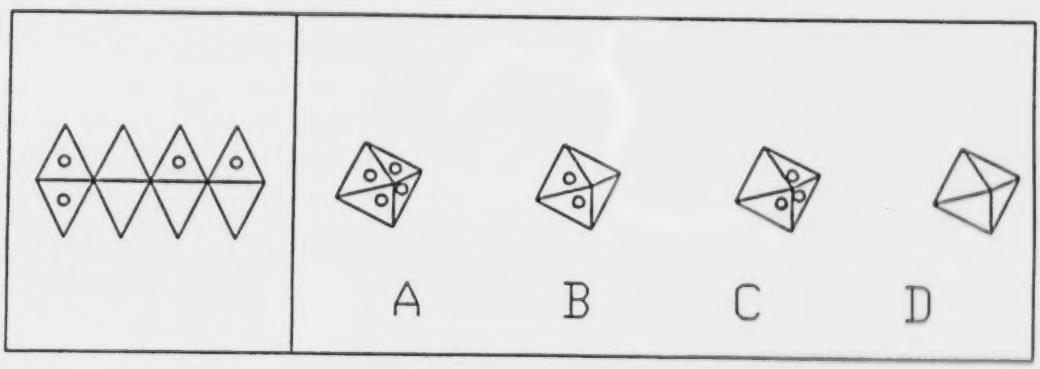
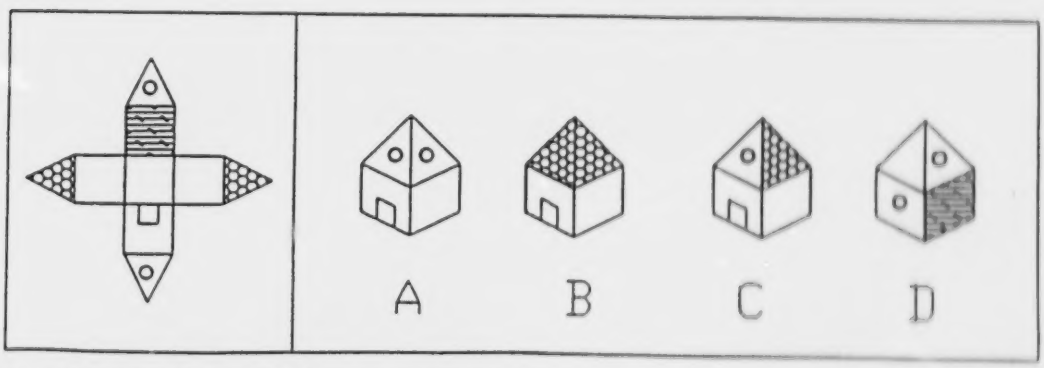
Handout 1: Activity 2









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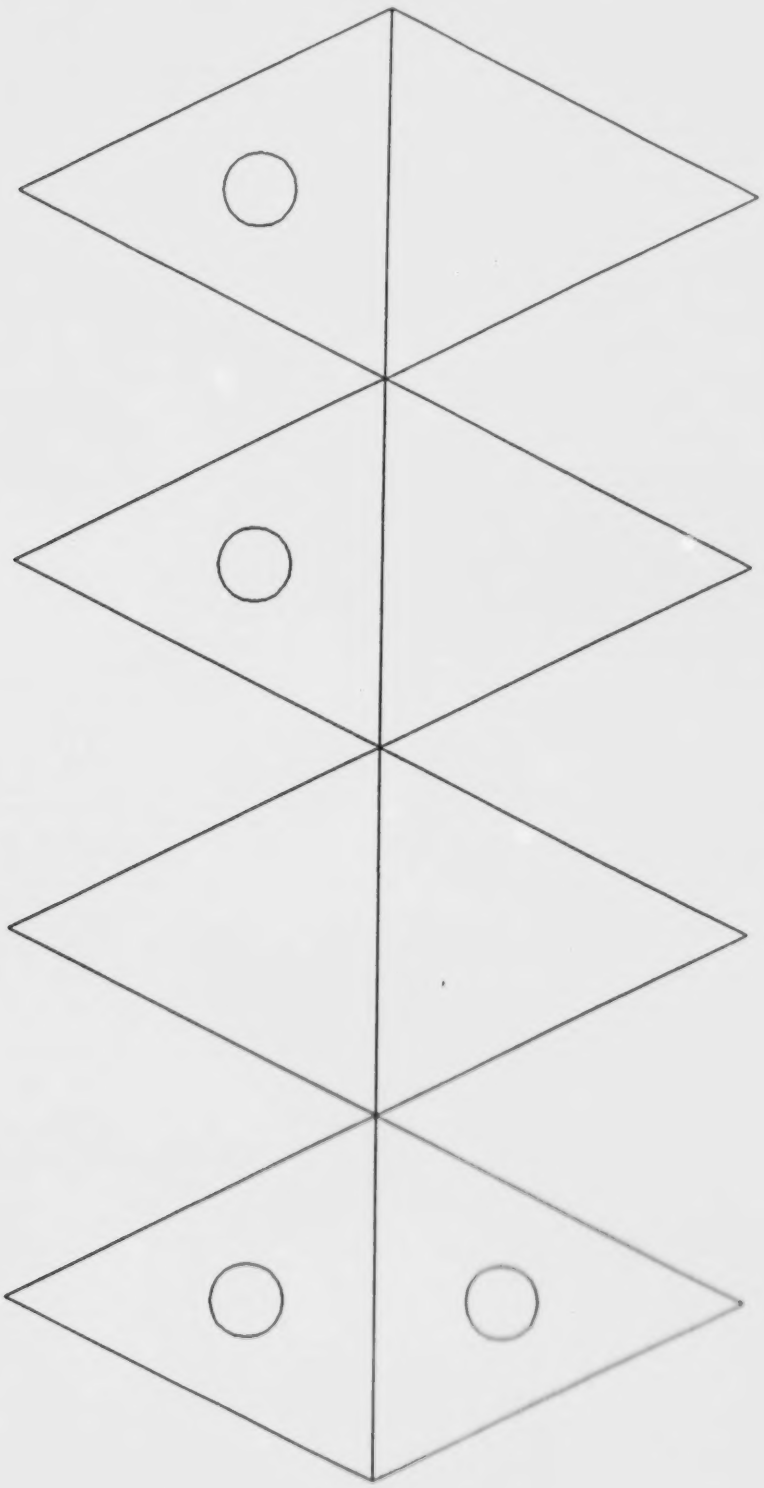
Activity 2: Pattern Master 1



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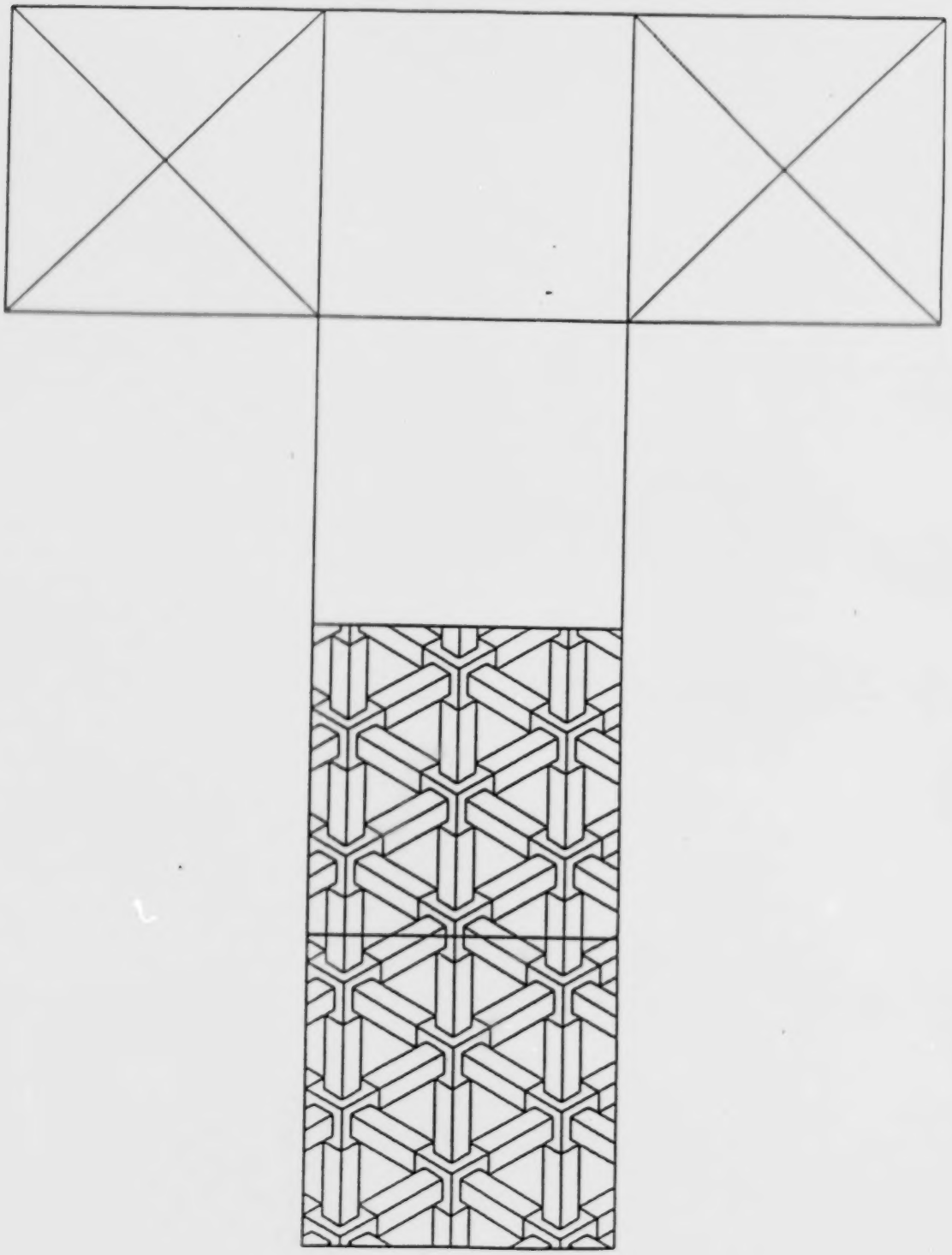

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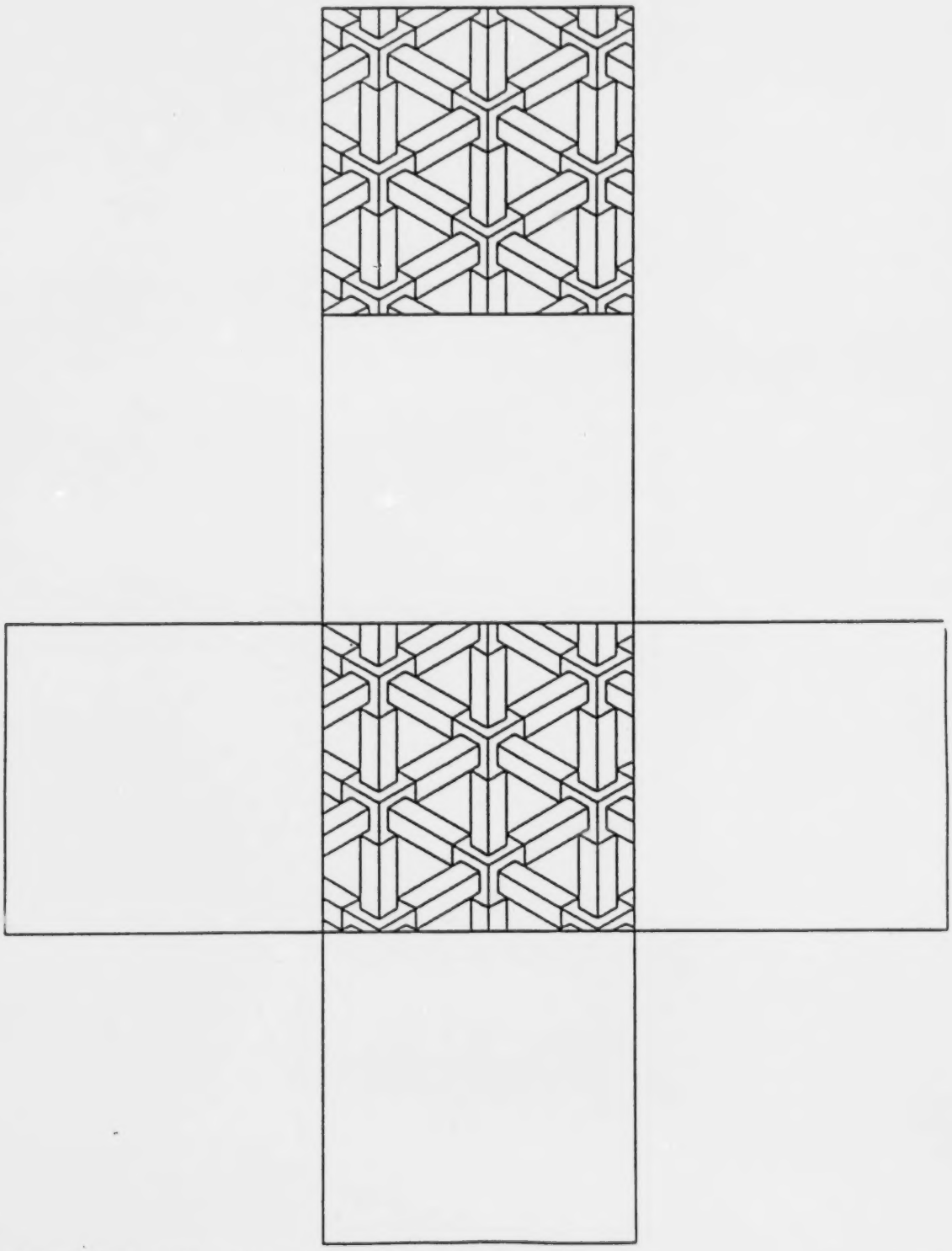

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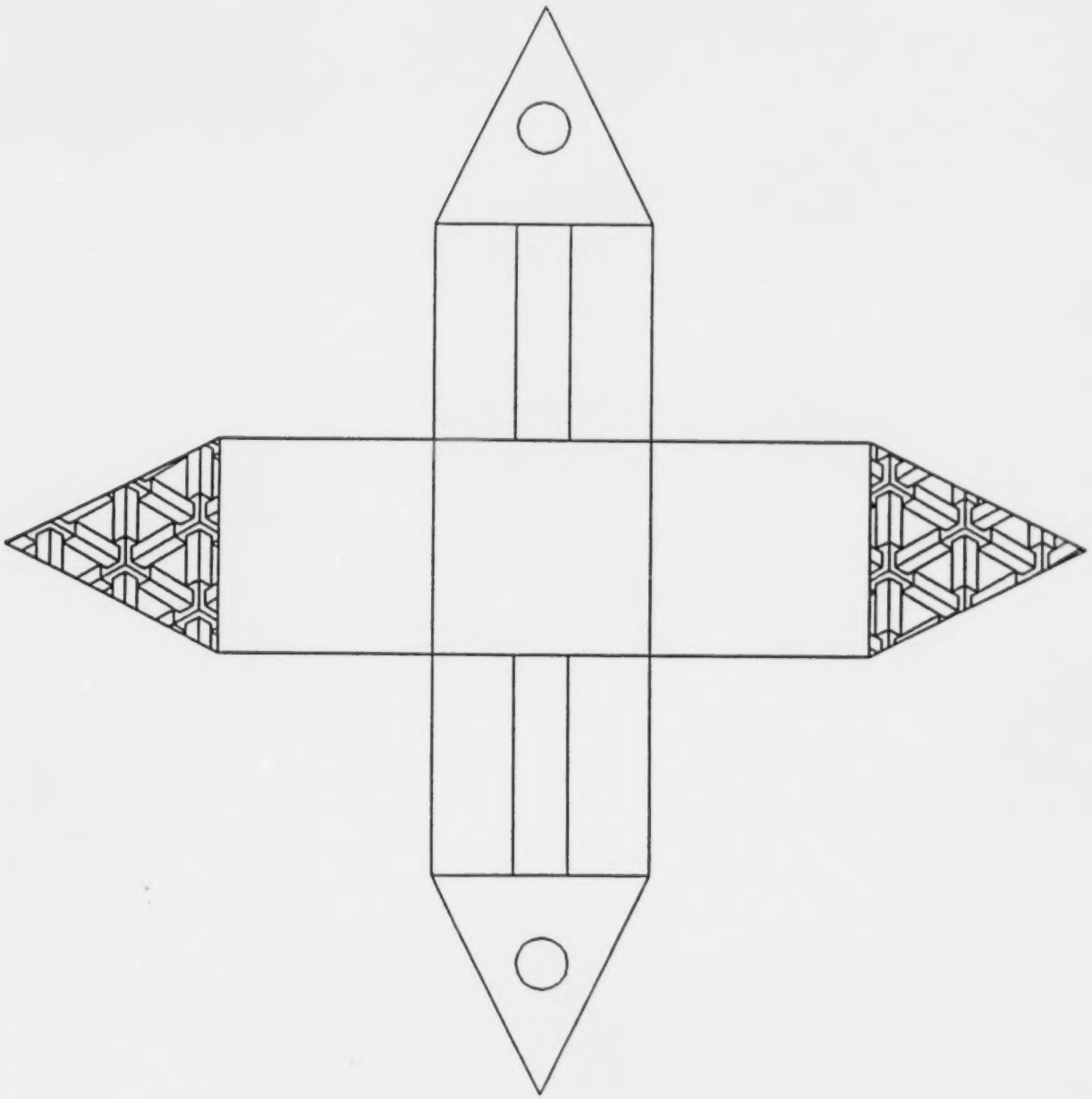

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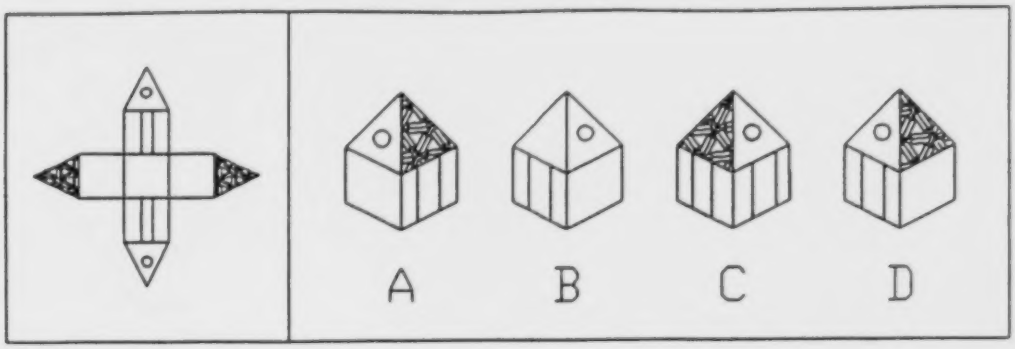
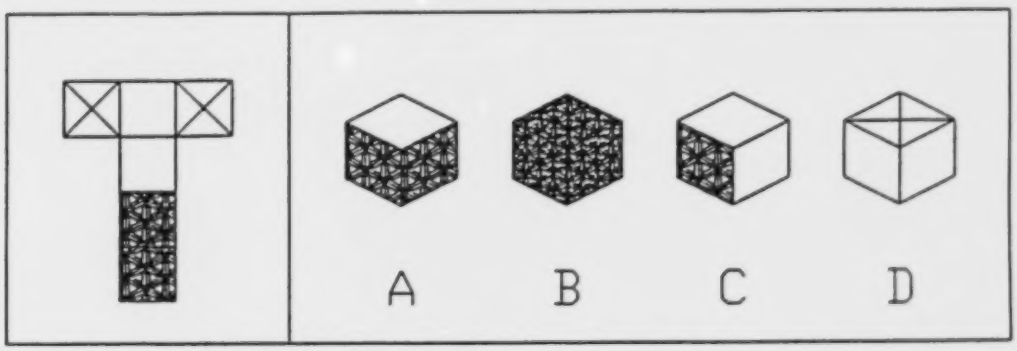
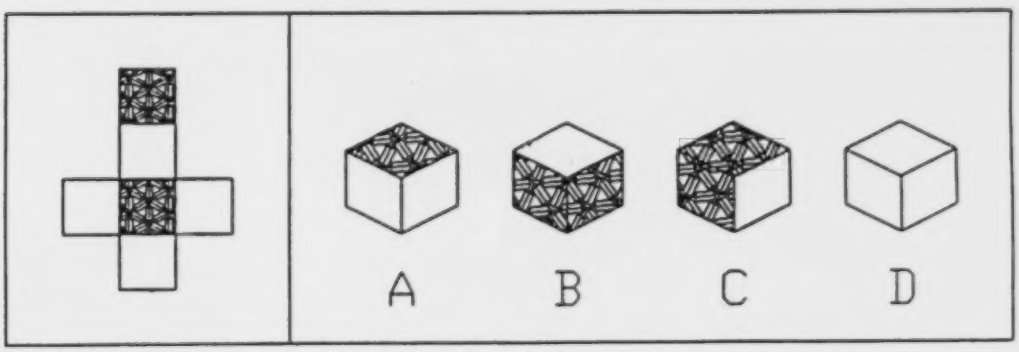
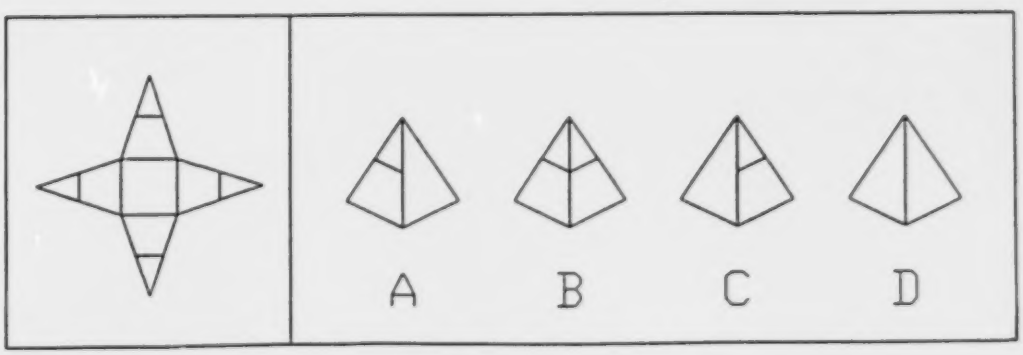
Handout 2: Activity 2









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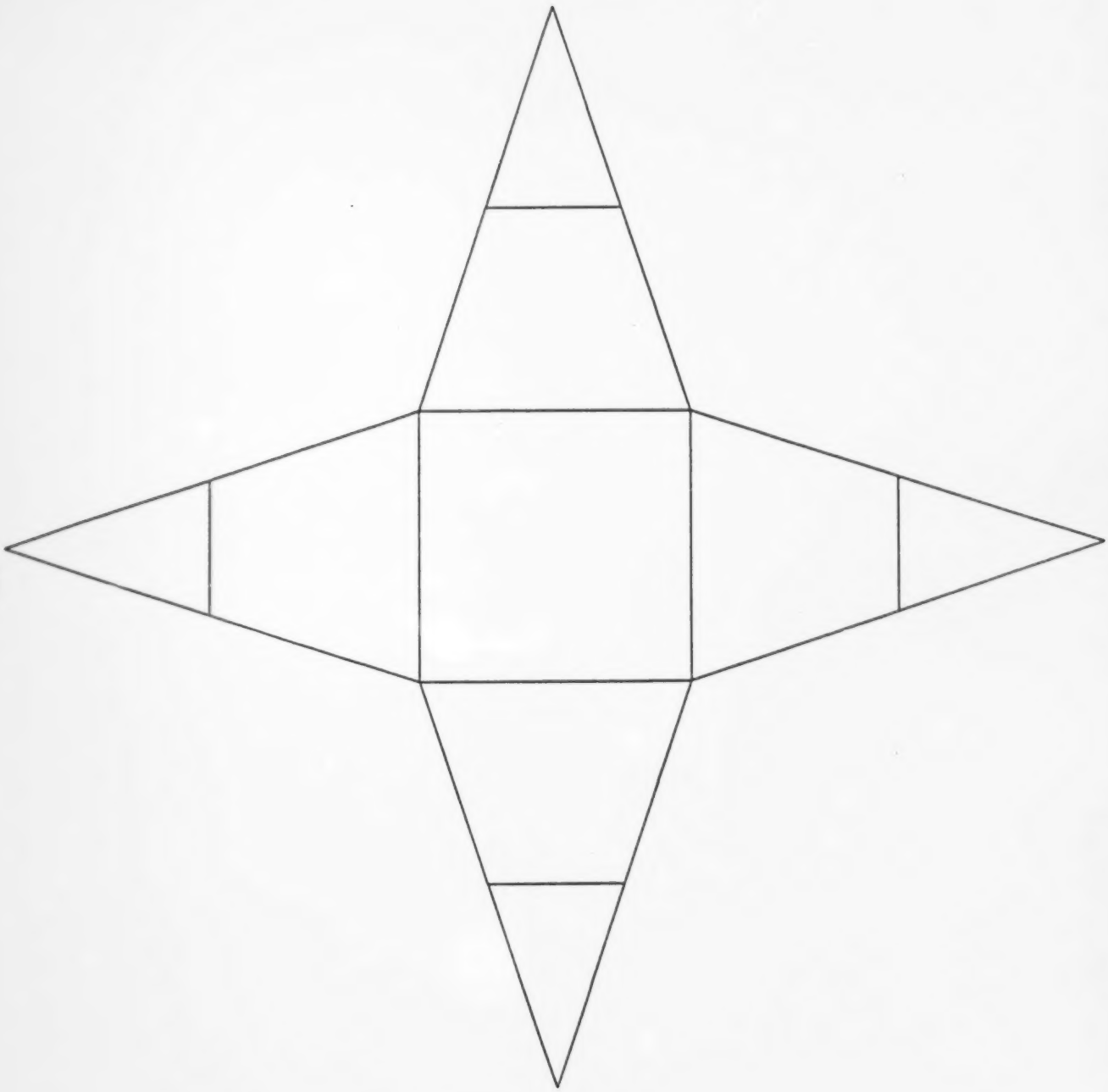
Activity 2: Pattern Master 5



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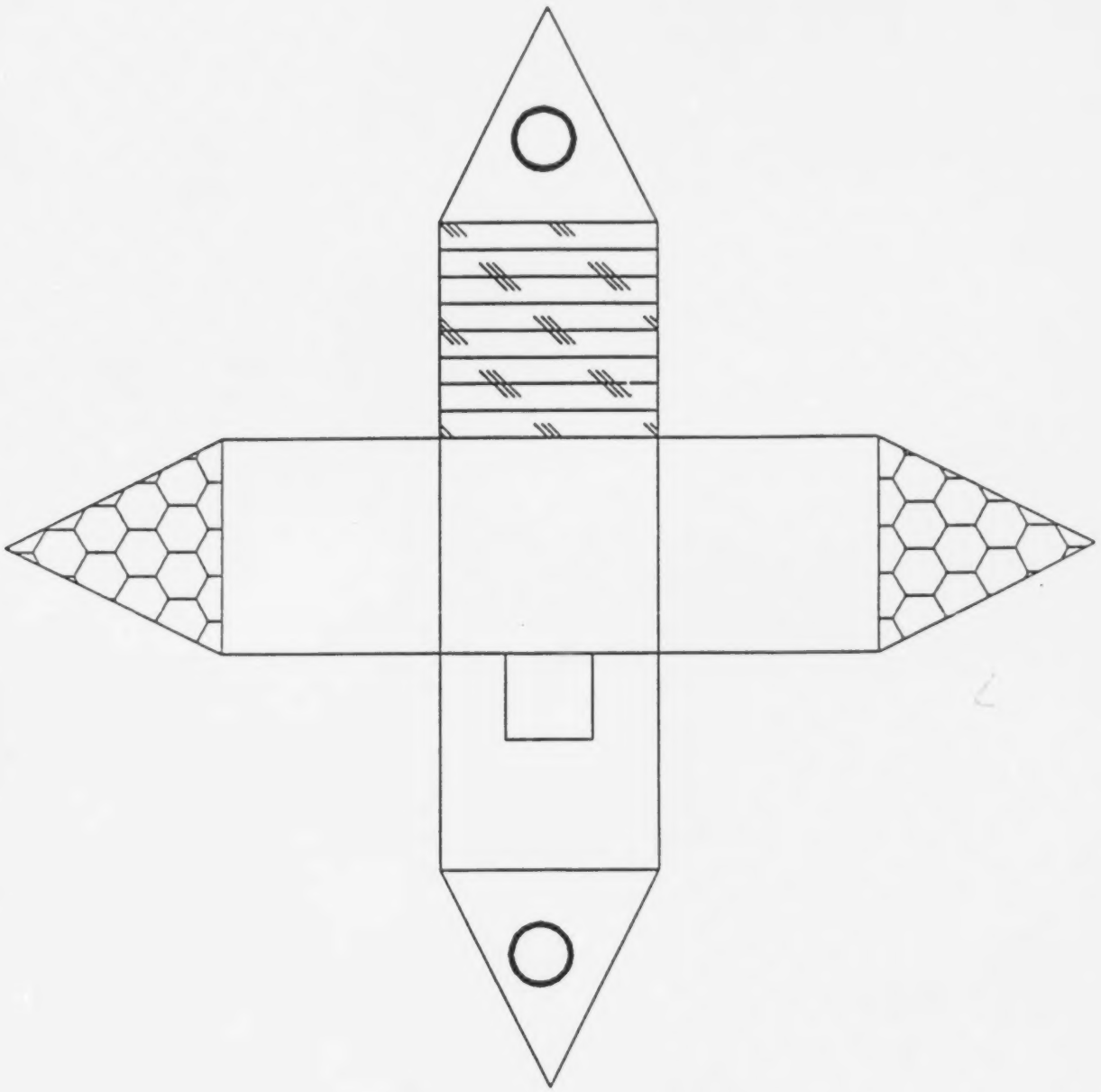

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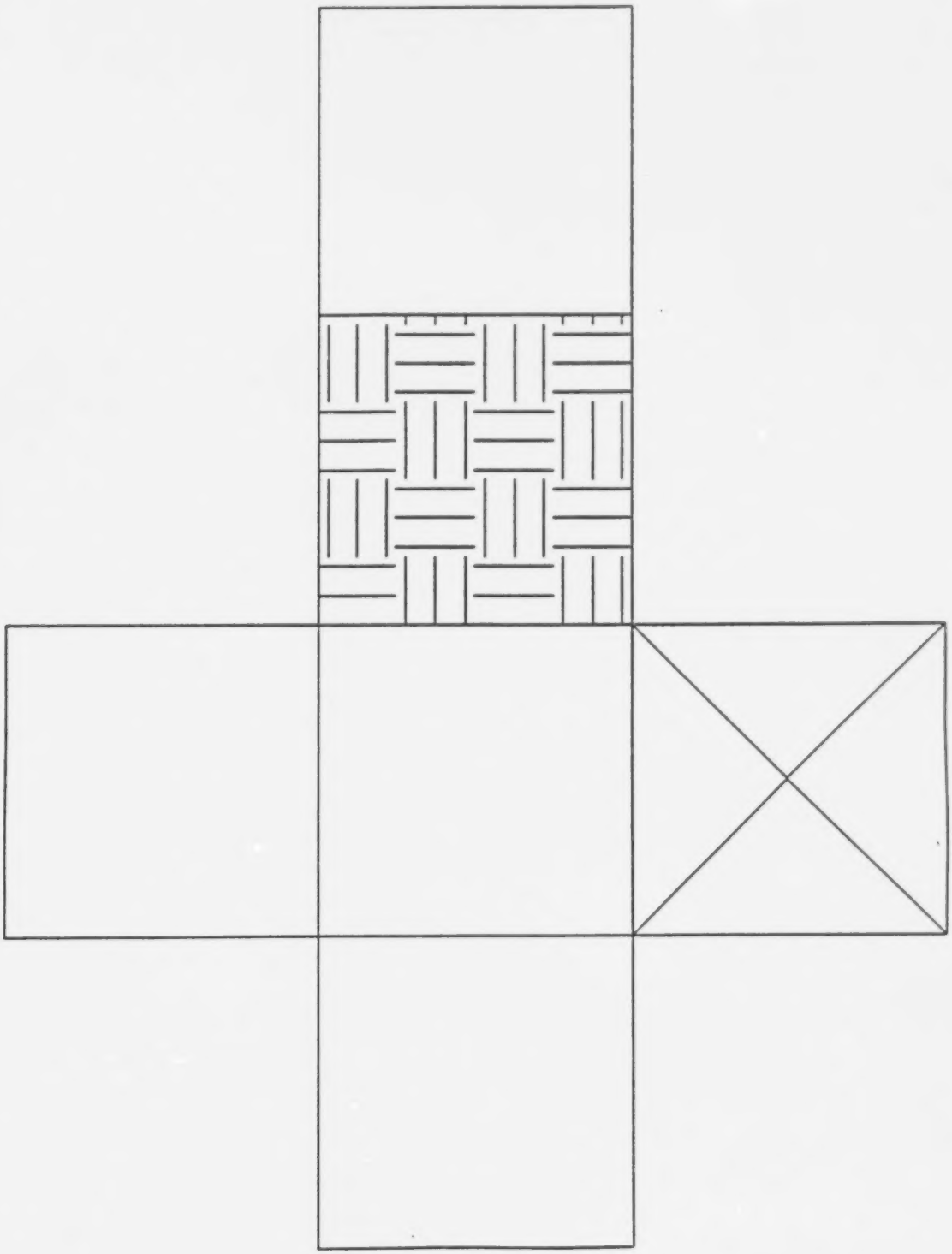
Activity 2: Pattern Master 7



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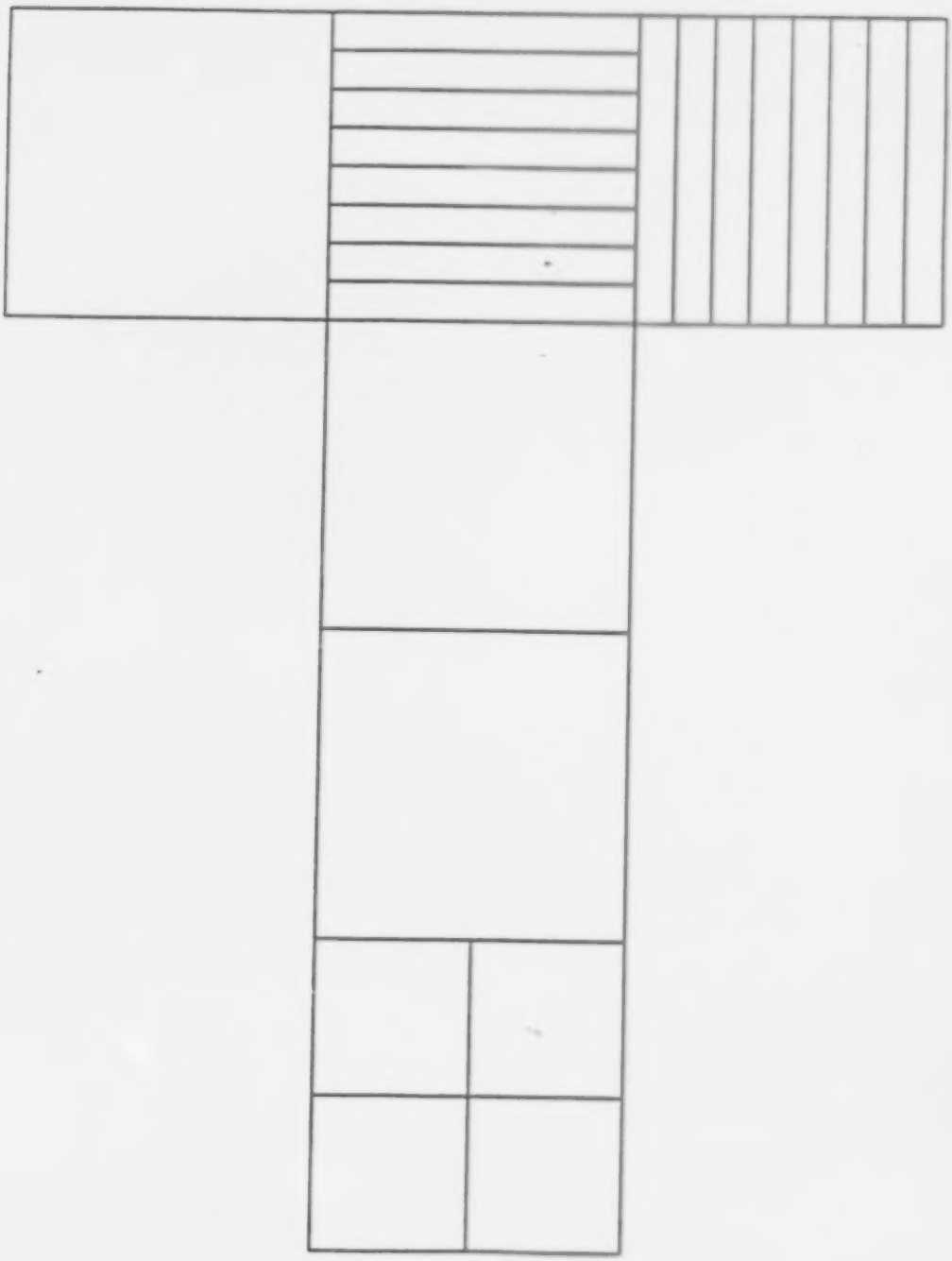

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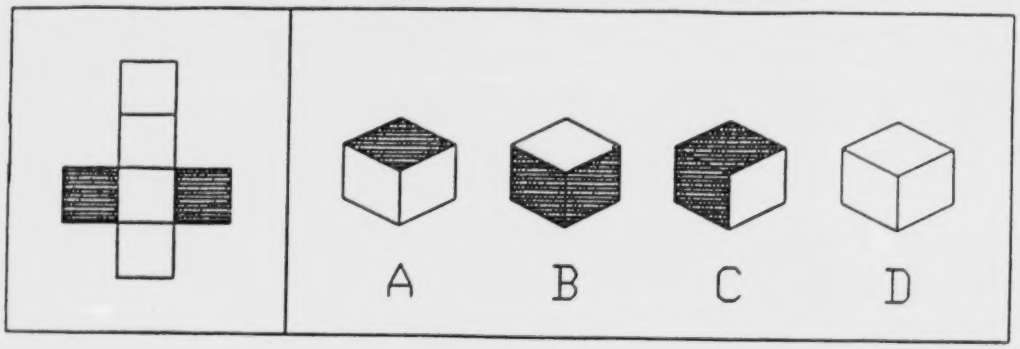
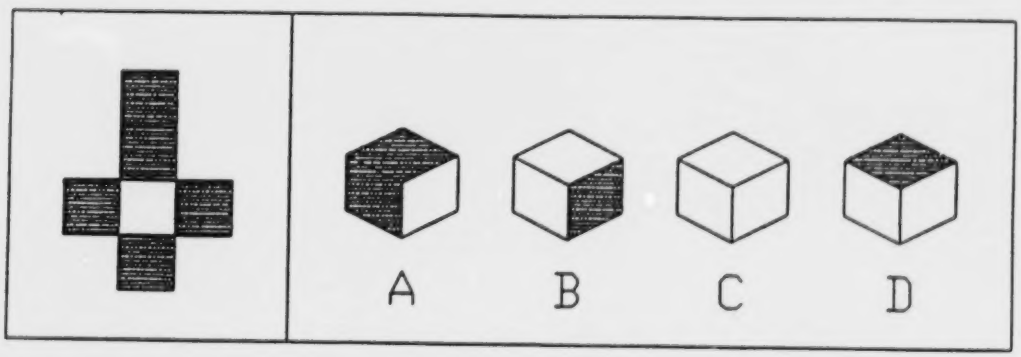
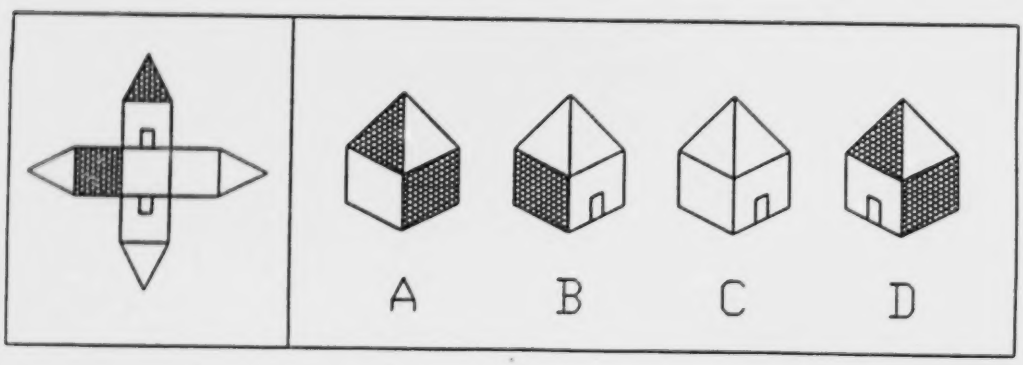
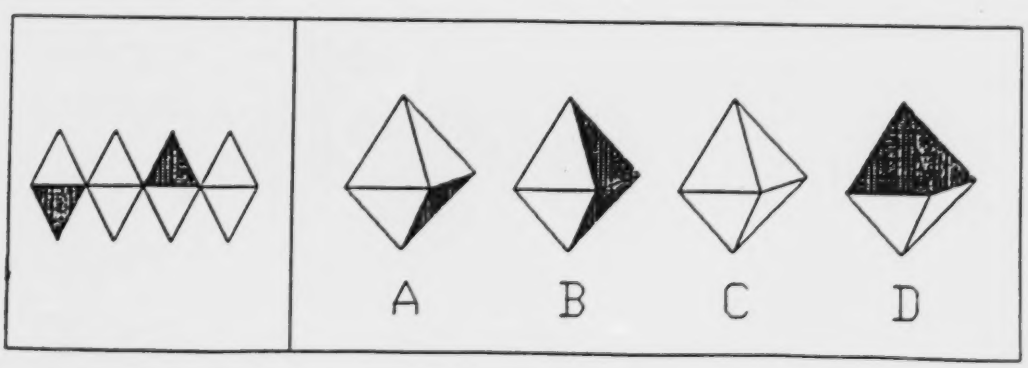
Activity 3: Spatial Relations Worksheet 1









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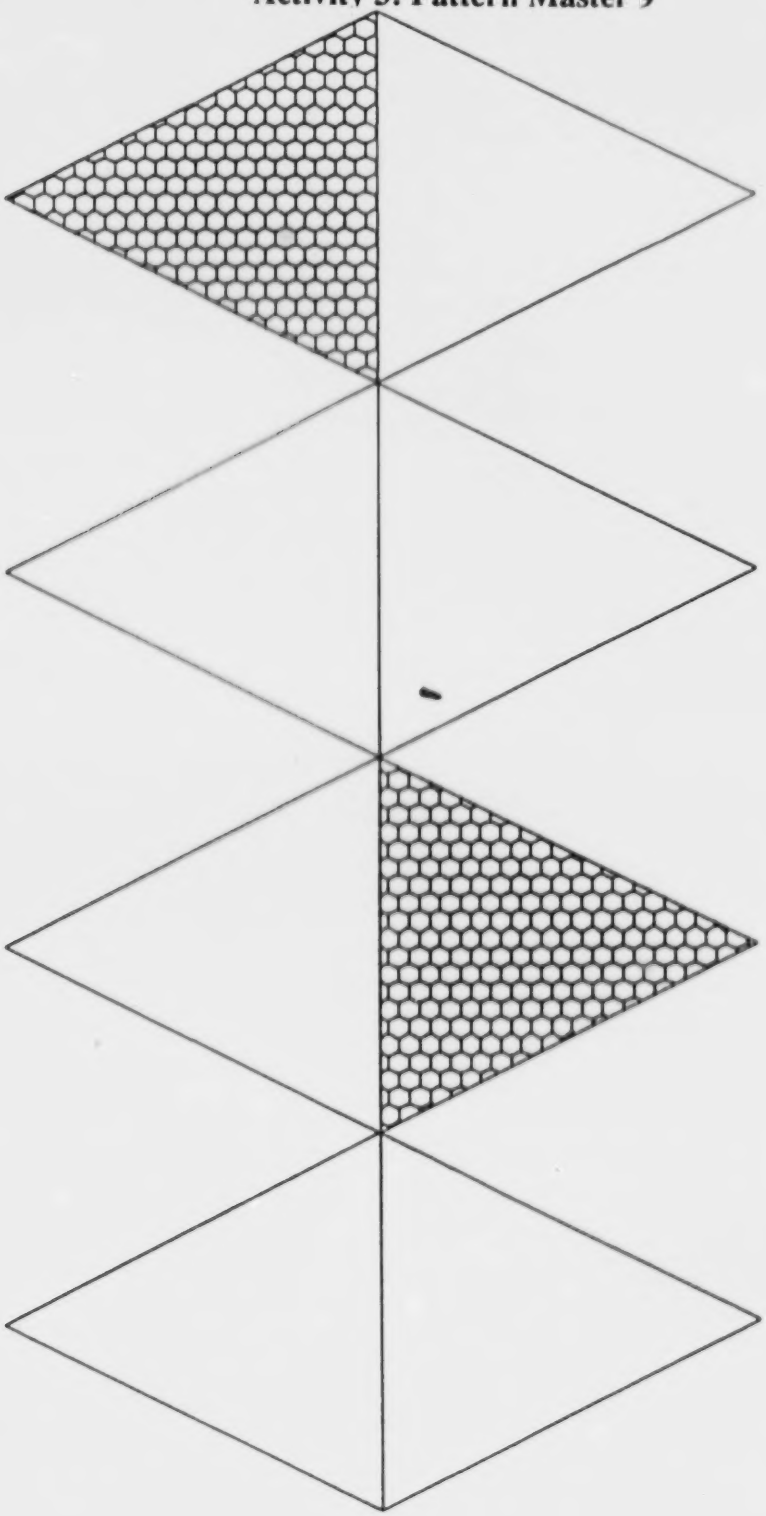

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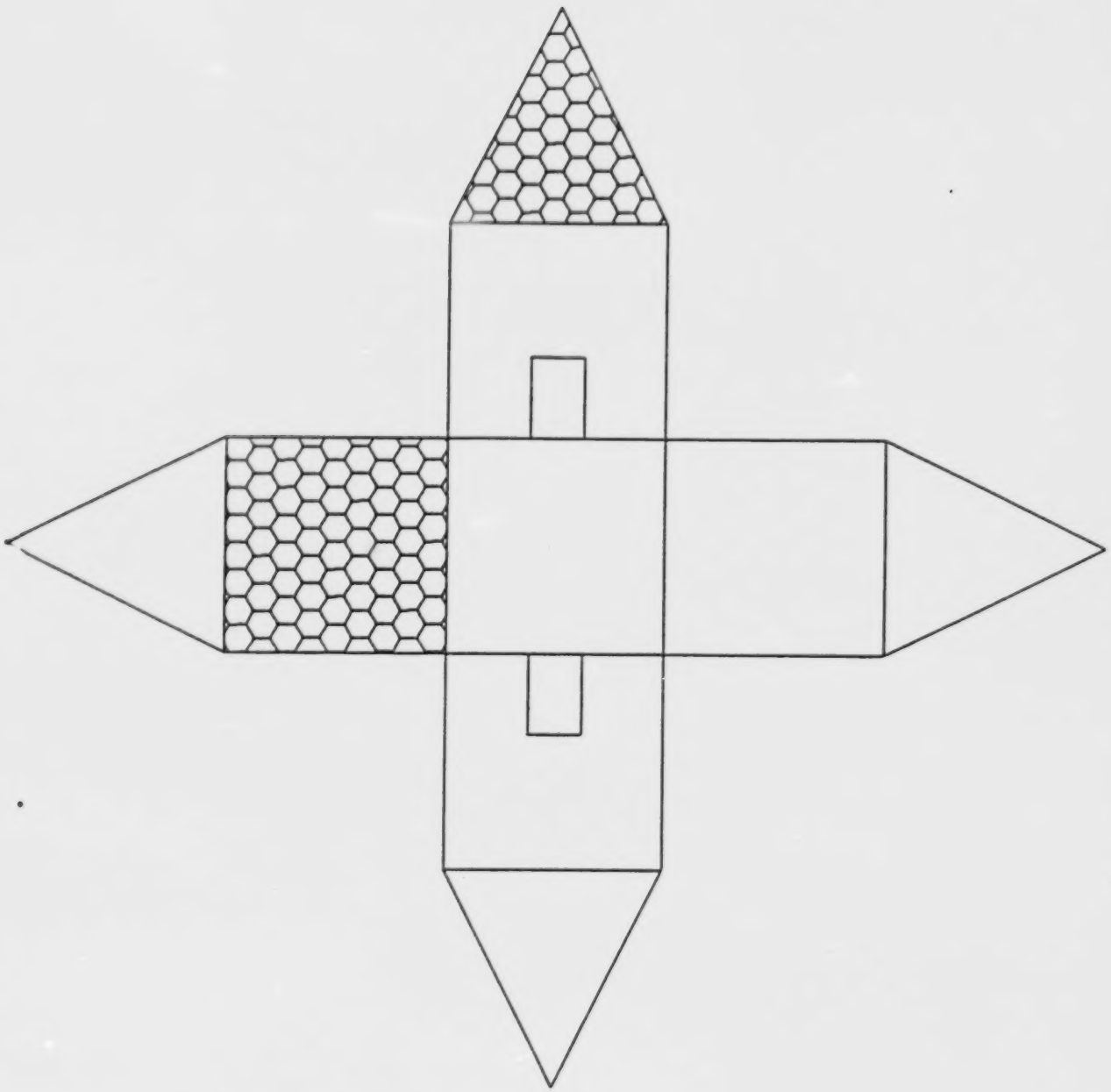

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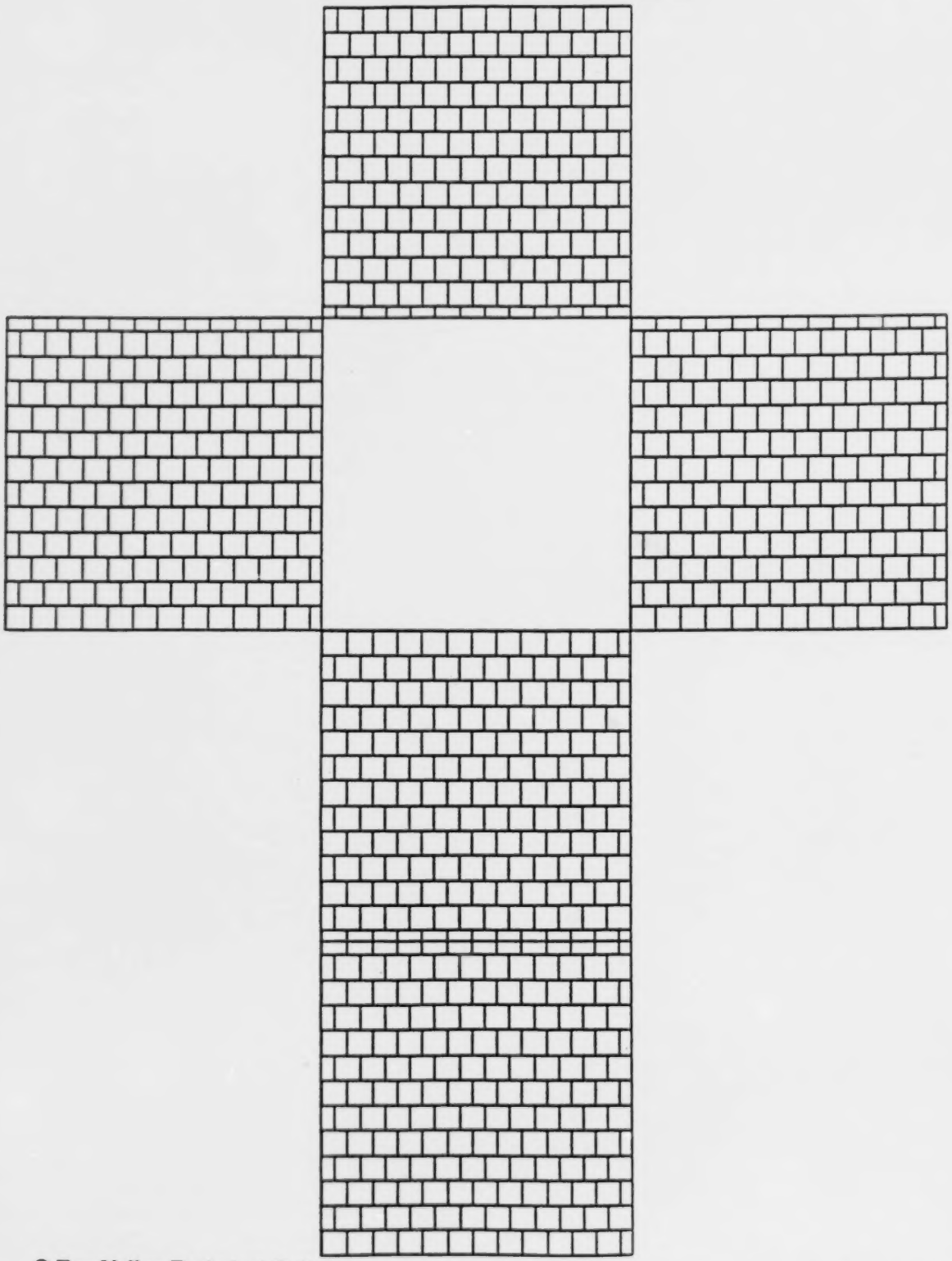

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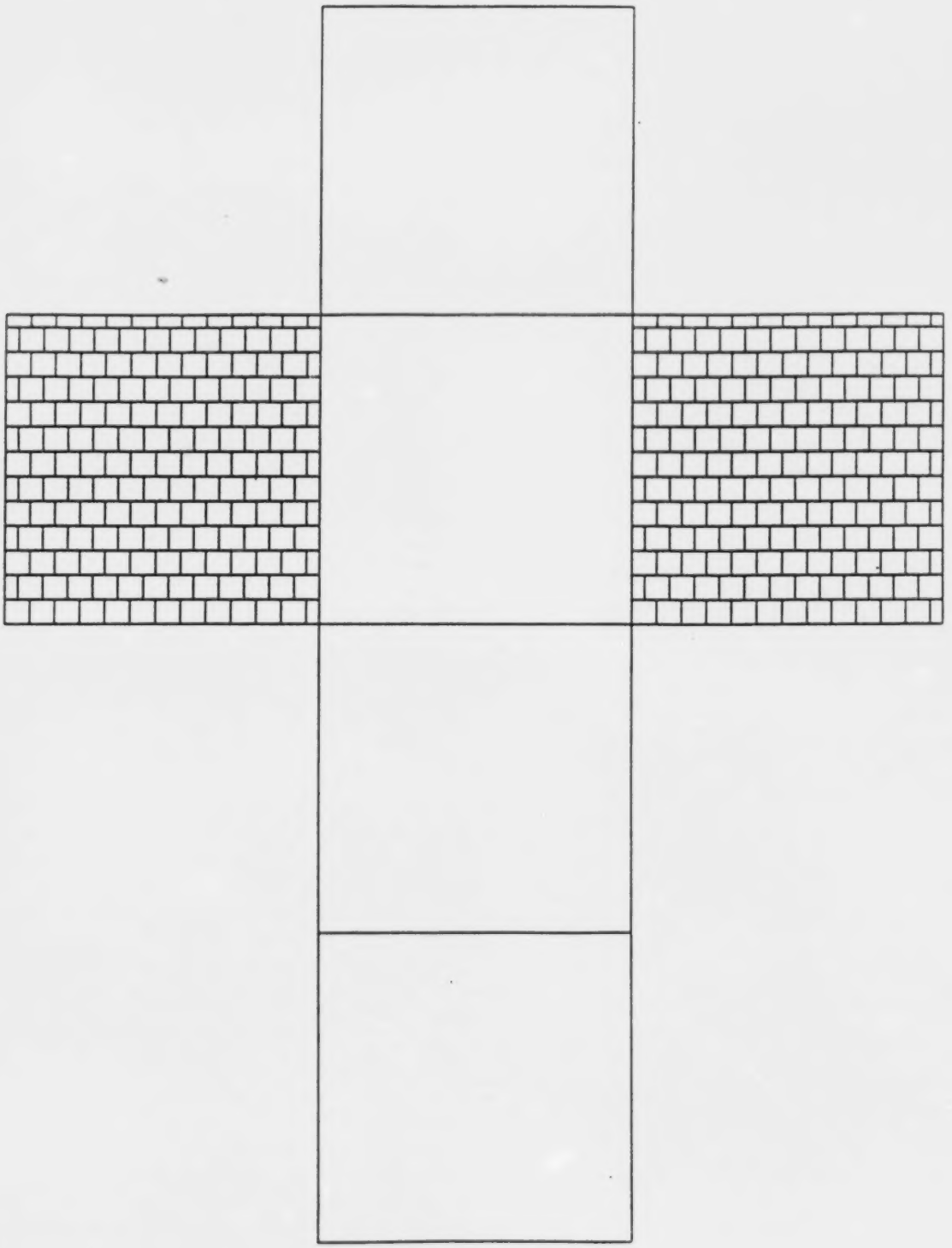

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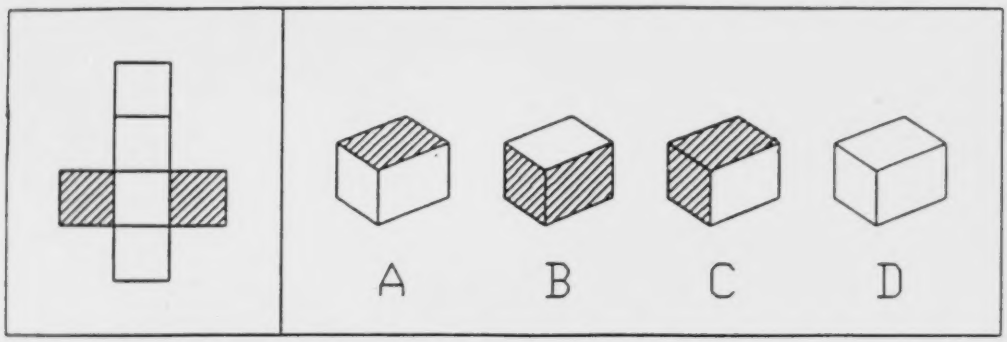
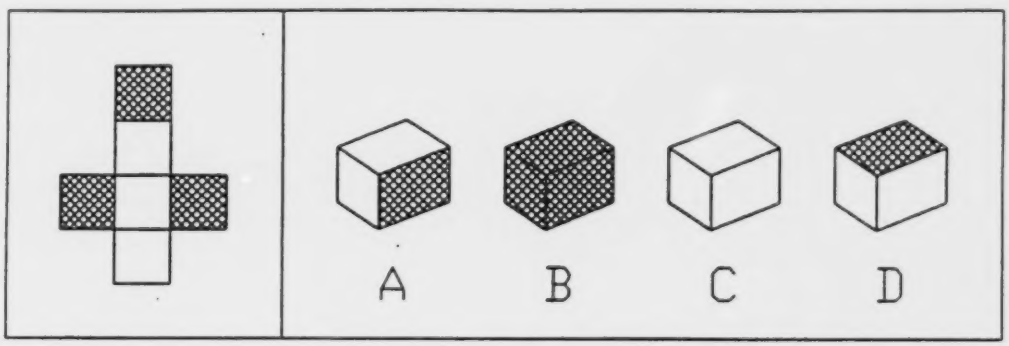
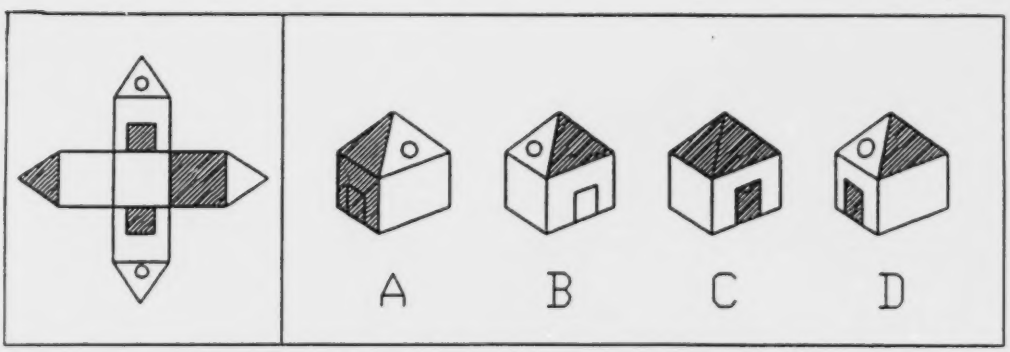
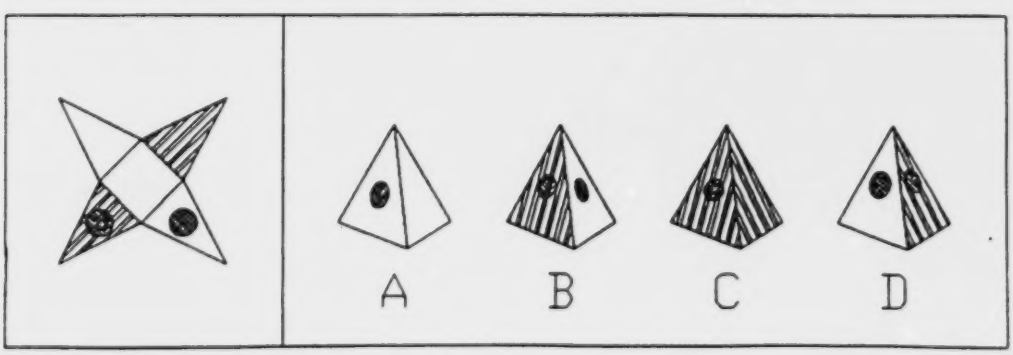
Activity 3: Spatial Relations Worksheet 2









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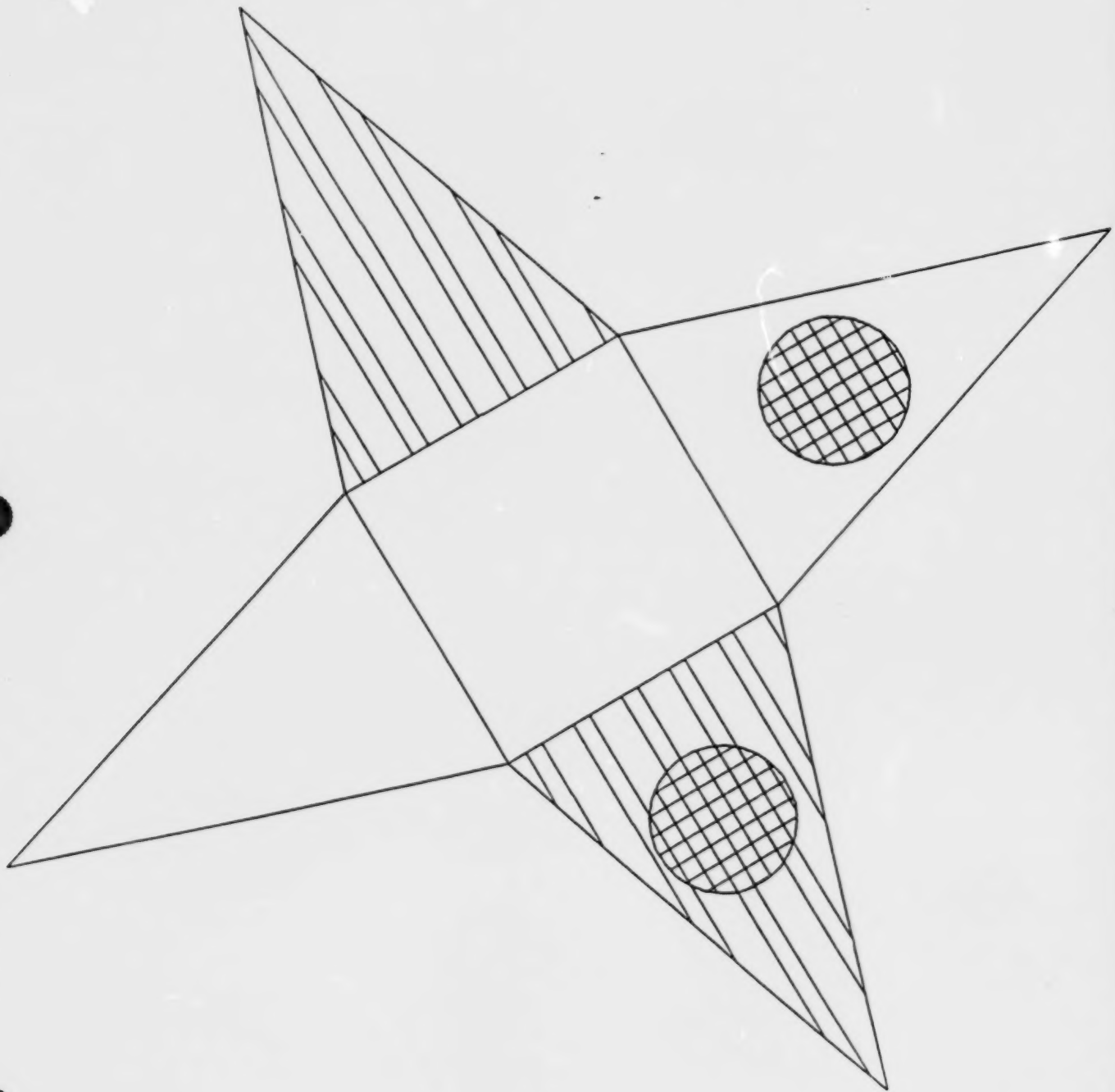

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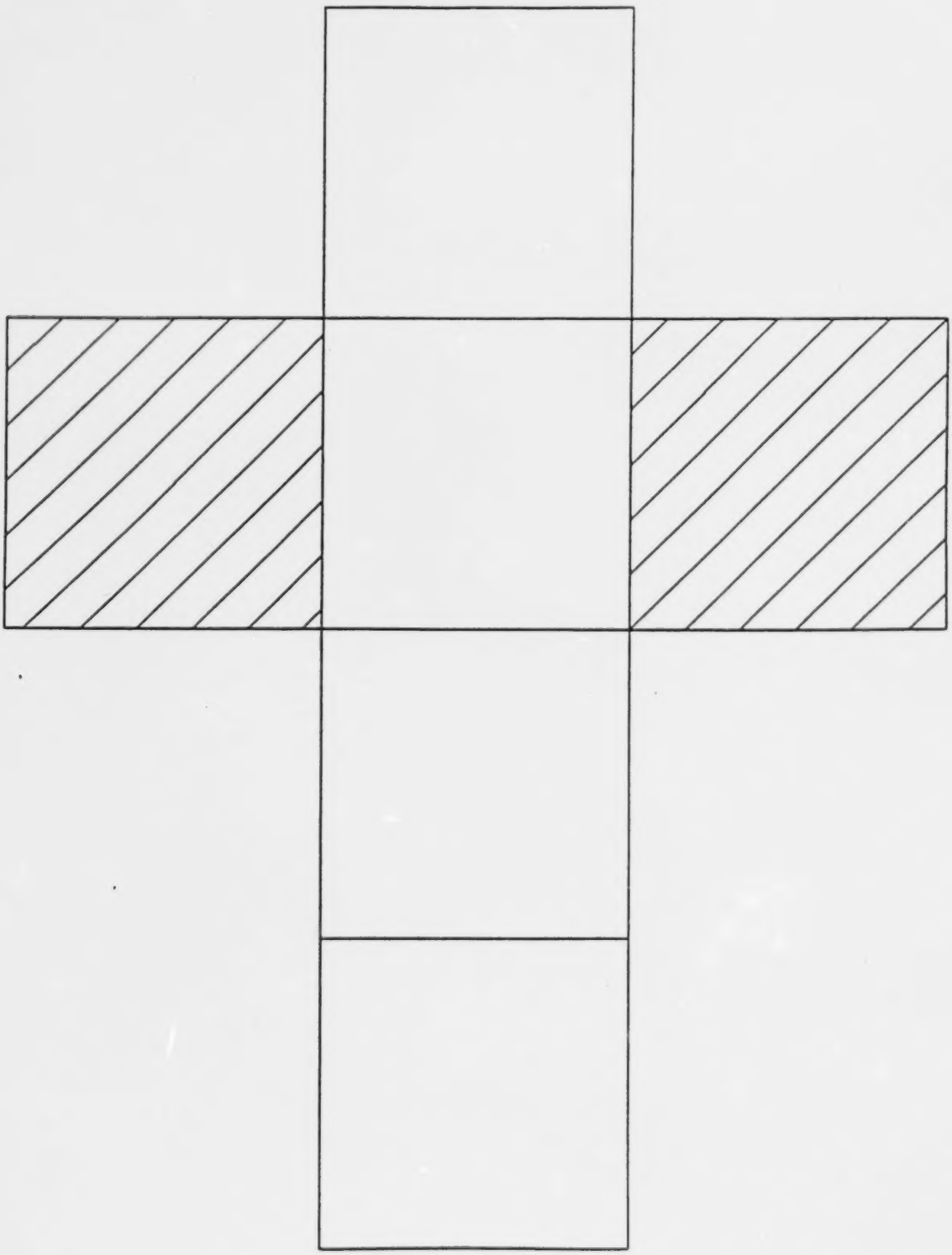
Activity 3: Pattern Master 14



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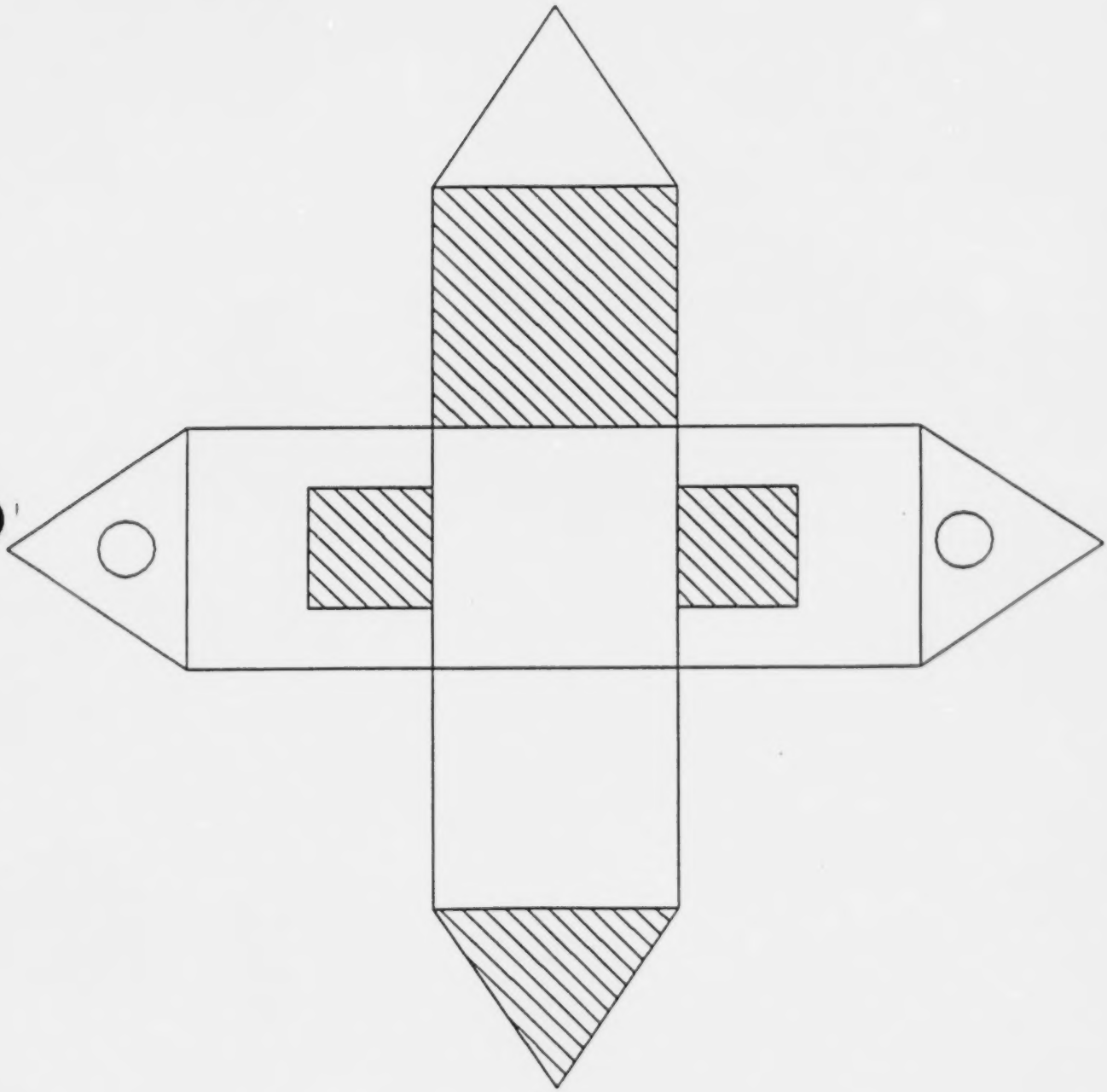
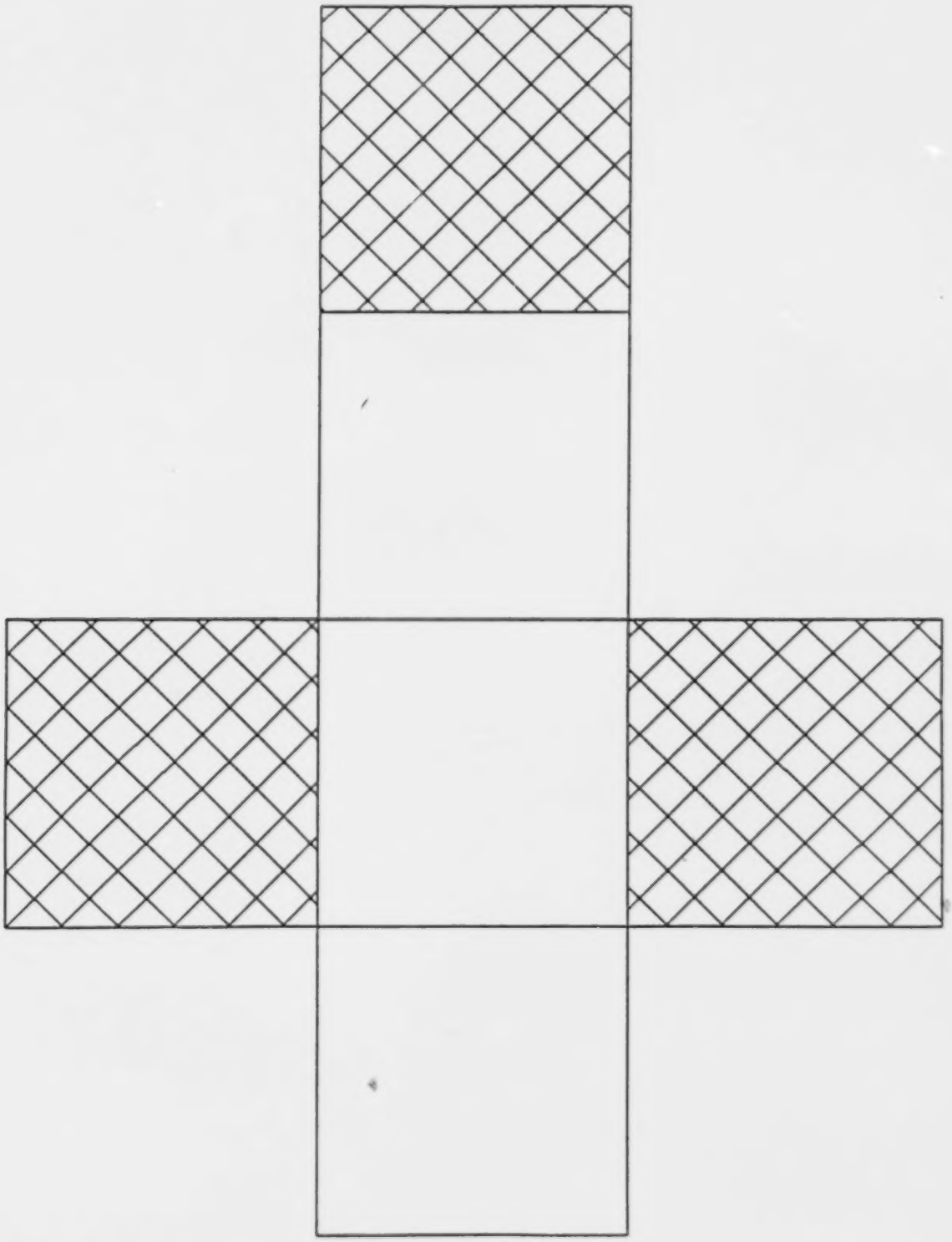
Activity 3: Pattern Master 15



Activity 3: Pattern Master 16



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Module Overview

Task: Identify and demonstrate the use of various types of hand tools used in the home and in industry.

Estimated Time: 9 hours

Outline:

1. Hand Tool Safety
2. Measuring Tools
3. Wrenches and Screwdrivers
4. Plumbing Tools
5. Electrical Tools
6. Metal Working Tools
7. Wood Working Tools

Performance Objectives

The student will be able to:

1. Identify various types of hand tools used in the home and in industry.
2. Describe the operation of various types of hand tools.
3. Demonstrate the proper use of hand tools.
4. List safety precautions to be followed when working with hand tools.

Study Guide

Completed ✓		Learning Activities and Resources
_____	1. Attend	Class lecture and discussion on hand tools and hand tool safety.
_____	2. Complete	Assignment 1—an individual presentation on a tool of student's choice.
_____	3. Read	Tool handout by Stanley Proto provided by the instructor.
_____	4. View	*"A, B, C's of Hand Tools"* by General Motors
_____	5. Attend	Classroom demonstration on hand tools by the instructor.
_____	6. View	"Hand Tool Safety" by Stanley Proto.
_____	7. Complete	Hand Tool Safety Test from Stanley Proto.
_____	8. Participate	Hands-on labs (3) using various types of hand tools.
_____	9. View	*"Hand and Power Tools"* by Hometime.

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Instructor Information

Equipment:

1. See tools listed for each lab.

Learning Materials:

1. Videos:
   a) "A, B, C's of Hand Tools" by General Motors.
   b) "Hand Tool Safety" by Stanley Proto.
2. Hand Tool Safety test by Stanley Proto.
3. Handout by Stanley Proto.

Lab Activities:

The instructor will follow the directions for each of the three labs, demonstrating the use of identified tools. Tools may be substituted or added at the instructor's discretion.

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Assignment 1
Individual Classroom Presentation

Instructor Information

Lesson Performance Objective:
The student will become familiar with hand tools used in a variety of occupations, learn the safe use of each tool and the correct nomenclature. This lesson will also help students build confidence in using tools at work or in the home.

Enabling Objectives:
The student will:

1. Collect information about five hand tools, including the proper use of the tool and the relevant safety factors.

2. Deliver a report in class, sharing the above information.

3. Identify and describe 20 basic hand tools.

4. Identify and describe six basic power tools

Preparation: One week prior to this lesson, assign each student to find five hand tools used in the home or at their place of work. Ask each student to research the tools, finding out (a) its proper name (b) its proper use, and the safety precautions to be followed when using the tool. Have several resource books on tools in the classroom that students can use to locate the information. The students should be encouraged to ask tradespeople, relatives and friends who are familiar with these tools for information about the tool.

Activities of this type help generate enthusiasm for the familiarity with tools. For many individuals, even hand tools can be intimidating. This lesson should help the students overcome this fear. The tool activities should be as much **fun** as possible. The students should be encouraged to pursue the use of hand tools outside the classroom.

After each student completes his/her classroom presentation, the instructor can provide additional information on each tool and demonstrate the tool to the class along with all safety precautions, stressing the safe use of each tool is important.

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Electrical Tools Lab 1
Instructor Information

Lesson Performance Objective:
The student will demonstrate the use of hand tools used in performing electrical/electronic tasks.

Enabling Objectives:
The student will:

1. Identify hand tools commonly used in performing electrical/electronic related tasks.
2. Demonstrate the use of hand tools used for cutting and stripping wire.
3. Demonstrate the use of a soldering station to make connections of wires and electrical components.
4. List the safety precautions to be followed when working with hand tools used for electrical/ electronic tasks.

Required tools:
Each station should be equipped with:

1. Safety glasses
2. Needle nose pliers
3. Diagonal wire cutter
4. Wire stripper
5. Soldering station
6. Assorted wire
7. Assorted small electronic components
8. Small bare circuit board

Preparation: The instructor should arrange the work area so that two students are assigned to an activity. In addition, you may wish to arrange for an additional supervisor to be present to help instruct students in the proper use of the hand tools.

This activity will provide the students the opportunity to try out various hand tools used in the electric/electronic field. The instructor should stress to the students that this is only an introduction to the tools. It takes practice to become proficient with tools, and they should not become frustrated if it feels strange at first.

continued...

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Presentation
The instructor should demonstrate each activity:

1. Cutting wire
2. Stripping wire
3. Making various wire connections
4. Soldering wire connections
5. Soldering electronic components on circuit boards
6. Solder less connectors
7. Use of wire crimp tools
8. Repair of power cords

Carpentry Hand Tool Lab 2

Instructor Information

Lesson Performance Objective:
The student will become familiar with basic hand tools used in the carpentry trade.

Enabling Objectives:
The student will:

1. Measure and mark a 2' length of 2 x 4, using a steel square.
2. Cut an 18" length of 2 x 4 with a hand saw.
3. Measure and mark fractional distances on a 2 x 4.
4. Drive four spikes into a 2' length of 2 x 4.
5. Drive and set 6 finishing nails in a 2' length of 2 x 4.
6. Find the center point on a piece of wood.
7. Measure the distances from the center and from the edges of a square piece of wood.
8. Drill pilot holes for screws.
9. Drive 4 slot-type screws.
10. Drive 4 Phillips-type screws.

Preparation: Prior to class, assemble all materials and tools in the shop area. Students should be assigned in teams of two and assigned a work area.

Activity 1

Tools

Steel Square
Combination square
Crosscut saw
Retractable tape measure

Materials

20-30—5' lengths of 2 x 4 (scrap pieces are adequate, as long as pieces are longer than 2')
Scrap 2 x 4 's for practice cutting

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Activity 2

Tools	*Materials*
Curved or straight claw hammer	Additional 2' lengths of 2 x 4
Nail set	16d nails
Retractable tape	Finish nails
Cats paw, rip chisel	

Activity 3

Tools	*Materials*
Standard screwdrivers	12-15 sections of 2 x 4's or 2 x 6's
Phillips screwdriver	1 1/4" drywall screws, Phillips head
Retractable tape	1" Flathead wood screws
Hand drill	wax or soap
Claw hammer	
Punch or scratch awl	

Presentation

Steps	*Key Points*
1. Review general safety rules for the shop area.	Safety glasses are to be worn when in the shop area.
2. Review safety rules for using hand tools.	
3. Distribute safety glasses and directions for each station.	
4. In the shop area, review the procedures for each station.	Demonstrate each tool and each operation, stress safety precautions.
5. When all stations have been explained, divide class into groups of two.	

The instructor should circulate among the students for (a) the correct use of the tools, (b) the correct choice of tools for each task and (c) the observation of safety rules. The instructor should provide assistance when needed and enough material should be available for students to try again if their first attempt turns out poorly.

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Carpentry Hand Tool Lab 3

Directions:

Activity 1

1. Measure two 18" lengths of 2 x 4's with a rule.
2. Using a combination square or steel rule, make a cut line at the 18" mark.
3. Cut the 2 x 4's at the 18" mark, using a crosscut saw, on the waste side of the line.
4. Proceed to Activity 2.

Activity 2

1. On the 1 3/4" side of the 2 x 4 that has just been cut, mark four points along the center. Mark these points with a pencil.
2. Drive 16d nail at each point without driving the nail at an angle, bending the nail or marring the wood.
3. Turn the 2 x 4 to the other side and mark 6 more points. Start with an awl, then drive finish nails to within 1/8" of the surface.
4. Using a nailset, drive the finish nails 1/8" below the surface of the wood.
5. Write your name on your work and turn it in.
6. Proceed to Activity 3.

Activity 3

1. Find the center point on your second 2 x 4 using a rule or combination square.
2. Mark four points equal distance apart along the centerline.
3. Using a hand drill, drill two pilot holes for the screws. Be sure to drill deep enough using a bit that is smaller than the screw.

continued...

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4. With a standard screwdriver, drive a slot-type screw into one of the undrilled points.
5. Apply wax or soap to a slot-type screw and drive into the other undrilled point.
6. Drive a slot-type screw into one of the pilot holes without soap or wax.
7. Apply wax or soap to a slot-type screw and drive into the last pilot hole.
8. Turn 2 x 4 over and repeat steps 3-7 using a Phillips screw and screwdriver.
9. You may use a hand drill to drill pilot holes on this side as well.
10. Put your name on the block and turn it in.

Module Overview

Task

Identify and discuss the six basic simple machines or combinations of machines and how they apply at work and at home.

Estimated Time

6 hours

Outline

1. Definition of Mechanical Advantage

2. Identification of Simple Machines
   a. levers
   b. incline plane
   c. wheel and axle
   d. screw
   e. pulley
   f. wedge
   g. gears

3. Compound Machines

Performance Objectives

The student will be able to:

1. Define the mechanical advantage.

2. Establish the labeling of sides and angles within a triangle.

3. Identify the relationships that exist within a right triangle.

4. Define machine and their parts.

5. Discuss methods used to determine and calculate the advantages of machines.

6. Conduct experiments using four types of machines.
   a. lever
   b. incline plane
   c. wheel and axle
   d. pulley

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Activity Guide

Completed ✓		Learning Activities and Resources
_____	1. Attend	Class lecture and discussion on mechanical advantage and simple machines.
_____	2. Read	Handout on simple machines provided by the instructor.
_____	3. Calculate	Ratios on worksheets.
_____	4. Participate	Lab experiments using simple machines.
_____	5. Attend	Classroom lecture and discussion on how simple machines are applied at work and at home.

Instructor Information

Machines We Use and How They Work

Activity 1

1. Discuss Handout 1 on Simple Machines.

2. Establish the labeling of sides and angles within a triangle using Handout 2.

3. Have the students study the relationships that exist within a right triangle:
   a) the ratios of the sides
   b) the relationships of angles and sides

   Ask the students to calculate the ratios and complete questions on Worksheets 1, 2 and 3.

4. Define machines and their parts.

5. Discuss methods used to determine and calculate the advantages of machines.

6. Conduct lab experiments 1, 2, 3 and 4 using appropriate lab worksheets. Students will need to collect data from their experiments, draw conclusions and discuss results. During Lab 5 instruct students on how mechanical advantage relates to gears. If equipment is available provide demonstrations.

Handout 1
Six Basic or Simple Machines

1. Lever

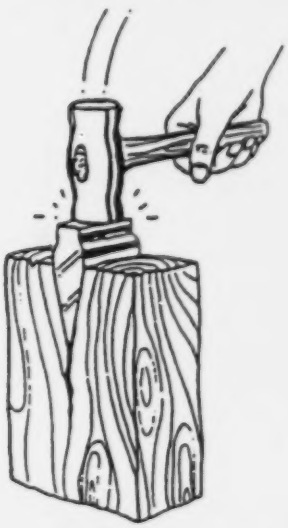
2. Wheel and axle

MACHINES WE USE
AND
HOW THEY WORK

3. Pulley

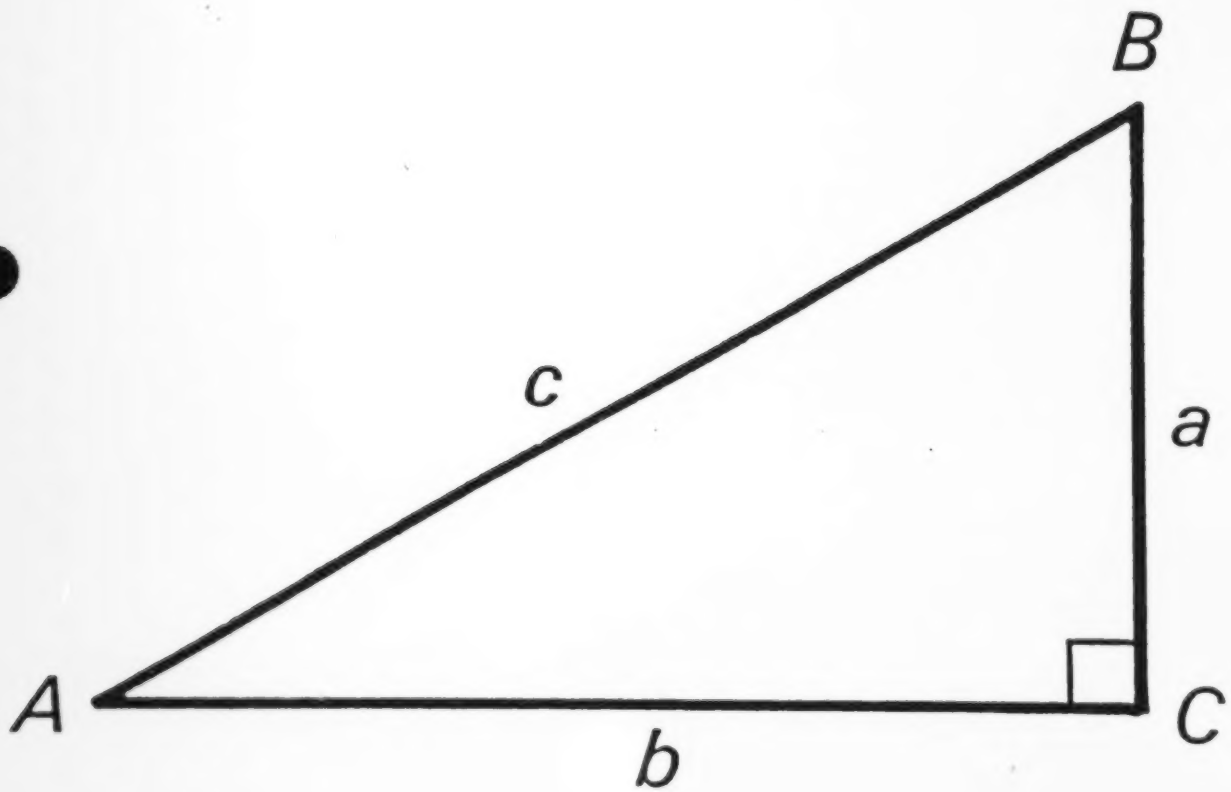
4. Inclined plane

5. Screw



6. Wedge

Handout 2—Labeling of Triangles



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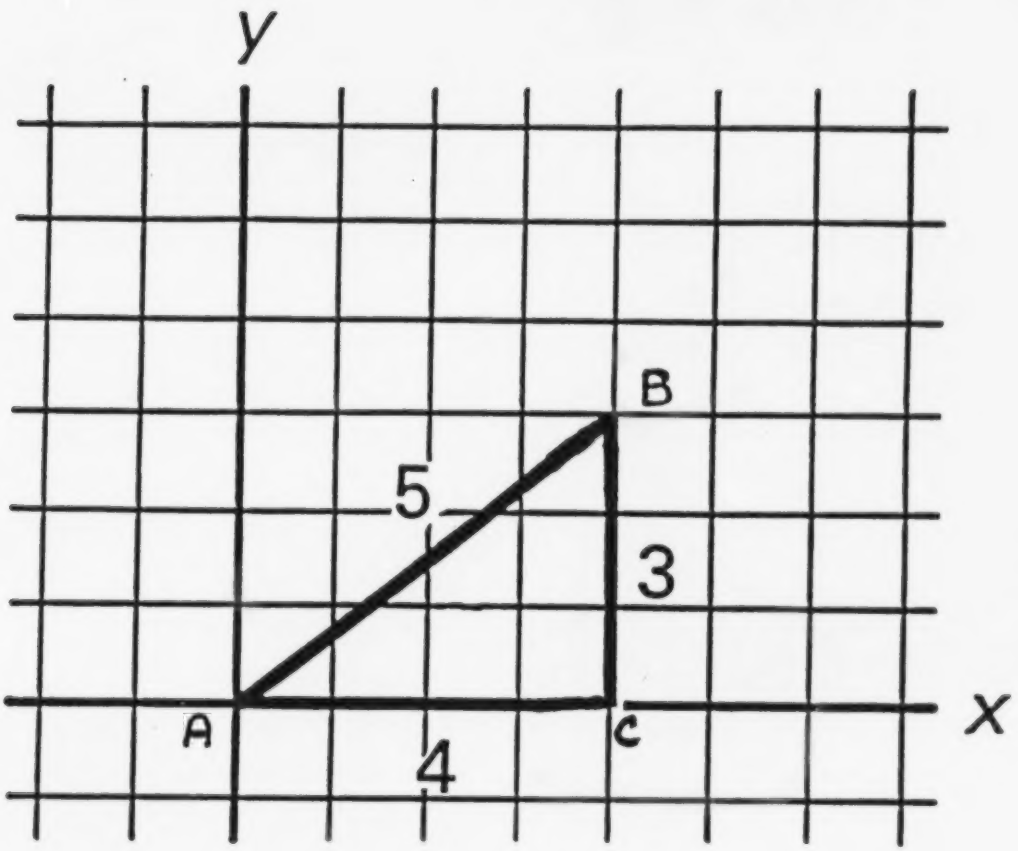
Worksheet 1

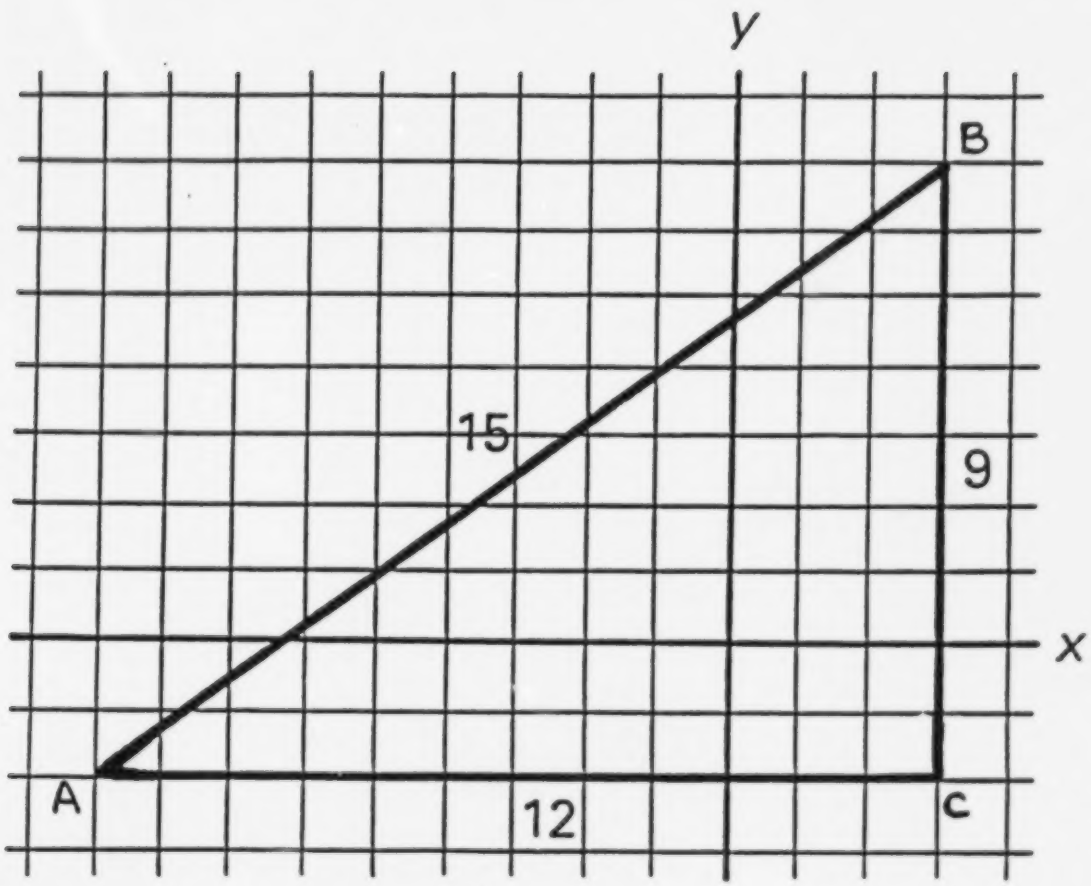


Calculate the following ratio

$\frac{a}{c}$ = _____ $\frac{b}{c}$ = _____ $\frac{a}{b}$ = _____

Measure ∠ A = _____

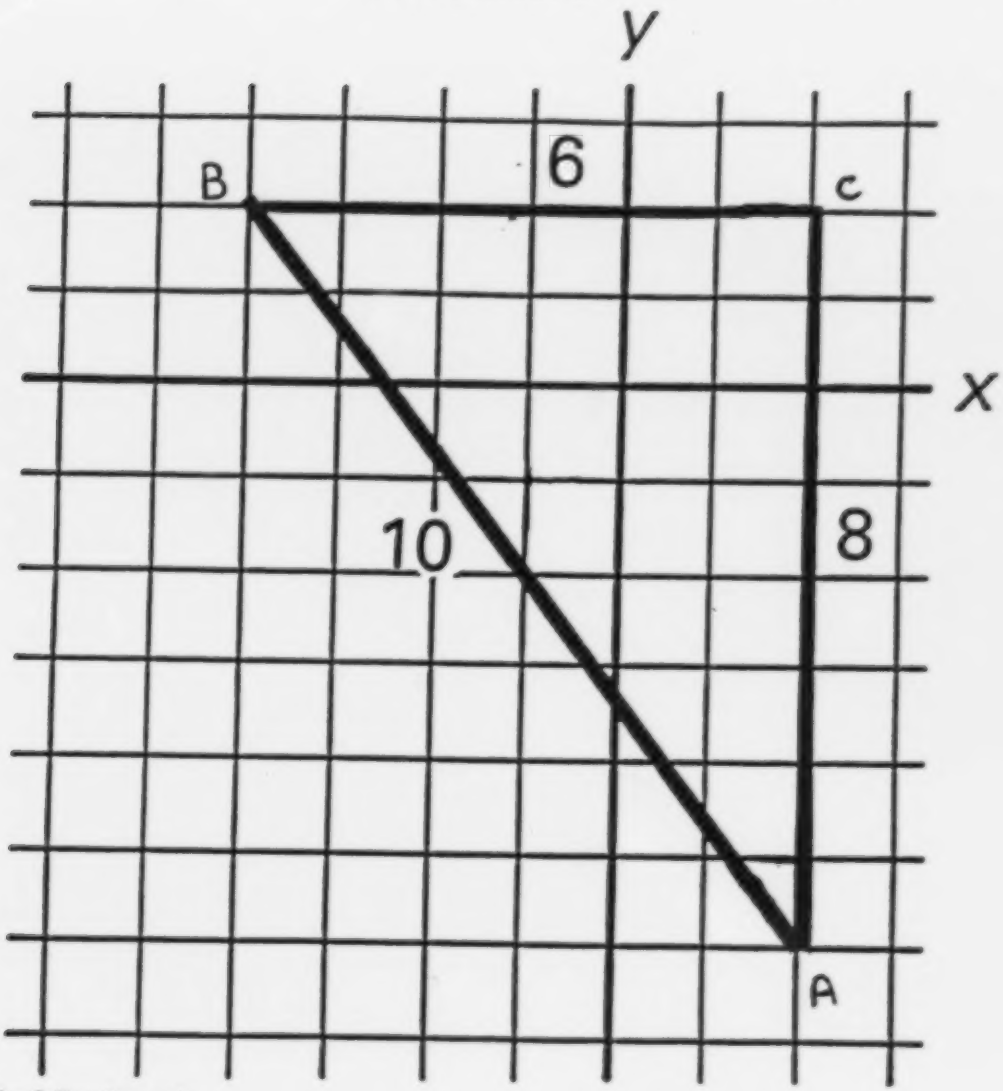
Worksheet 2



$\frac{a}{c}$ = _____ $\frac{b}{c}$ = _____ $\frac{a}{b}$ = _____

2. Measure ∠ A = _____

Worksheet 3



Calculate the following ratio

$\frac{a}{c}$ = _____ $\frac{b}{c}$ = _____ $\frac{a}{b}$ = _____

Measure ∠ A = _____

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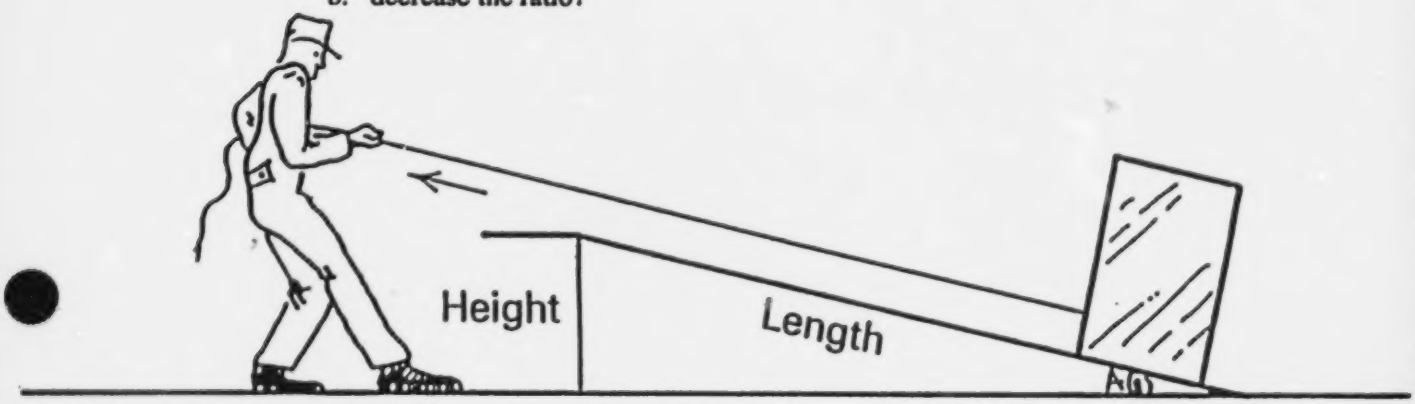
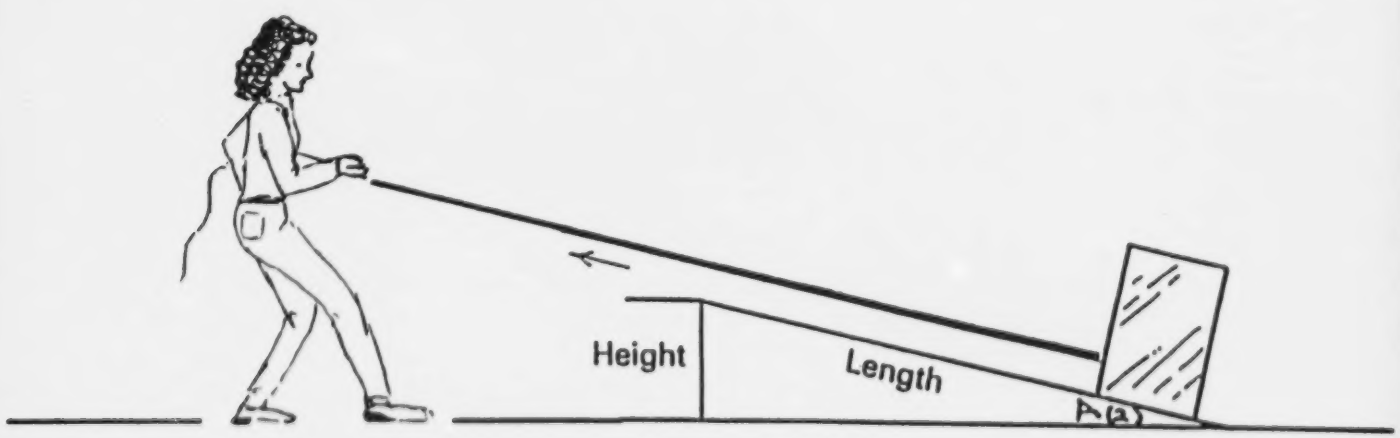
Worksheet 4

1. Measure the angle A in both figures below $\angle A_1 =$ _____
   $\angle A_2 =$ _____

2. What would you predict about the ratio of L/H in the two figures?

3. How could you:
   a. increase the ratio?
   b. decrease the ratio?





Worksheet 5
Machines

Mechanical Advantage	Defined
Calculated mA = d_E/d_R	d_E = Effort distance where the user of the machine is applying a pull or a push.
	d_R = Resistance distance where the load to be moved is applying a pull or a push.
Actual mA = F_R/F_E	F_R = Force, a pull or a push, which the resistance exerts. Resistance is the load to be moved.
	F_E = Force, a pull or a push, which the user of the machine exerts.

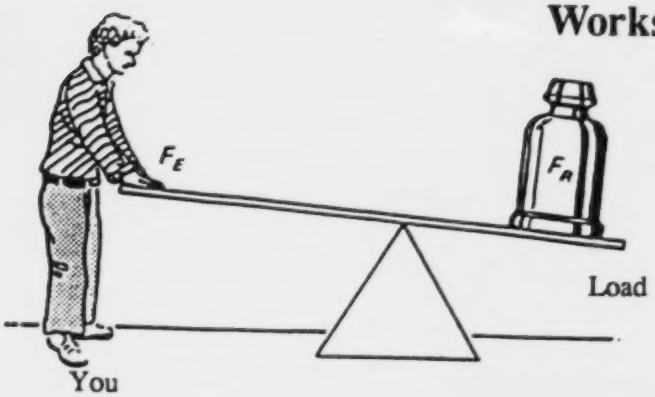
What are the calculated mechanical advantages of the two inclined planes on page 9? (show work)

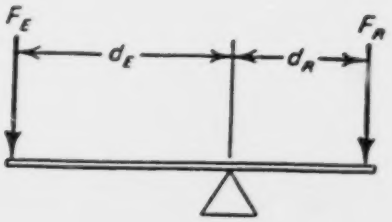
Incline (1)

Incline (2)

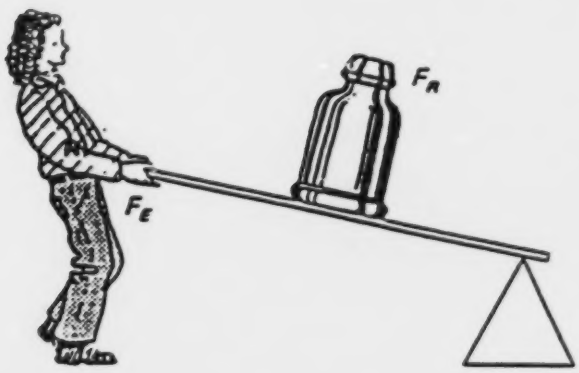
Remember: the calculated mA always depends on the distances.

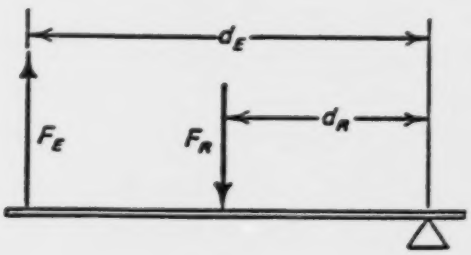
Worksheet 6



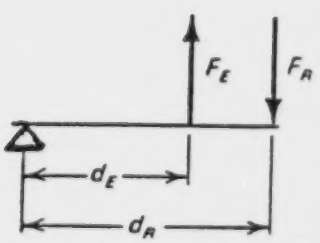


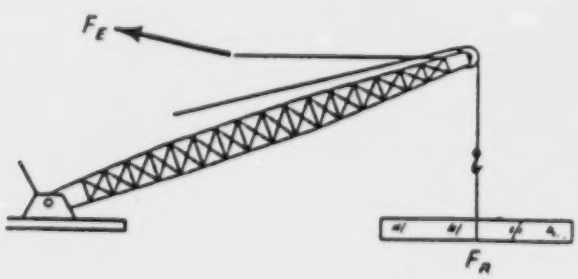
First class: The fulcrum is between the resistance force (F_R) and the effort force (F_E).





Second class: The resistance force (F_R) is between the fulcrum and the effort force (F_E).





Third class: The effort force (F_E) is between the fulcrum and the resistance force (F_R).

Lab 1—Levers

The purpose of this lab is to learn about the three classes of levers.

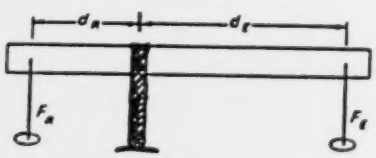
Equipment:

Meter stick
Spring scale
Weights
String

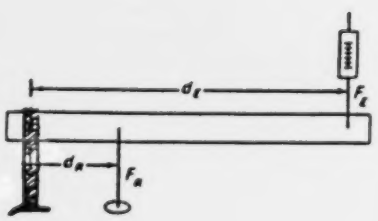
Procedure:

Set up examples of the three types of levers.

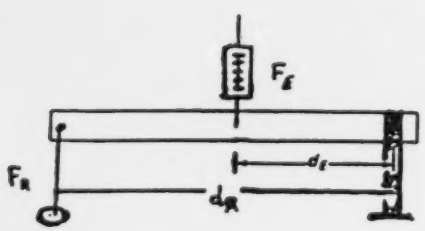
First Class



Second Class



Third Class



Lab 1—Leverscont.

Each group determines the effort force. Calculate the actual mA and the calculated mA

First Class (place support at 50 cm)

Group	Effort ForceFE	Effort Distance	Resistance Force FR	Resistance Distance dR	mA (Actual)	mA (Calculated)
1		45	570	10		
2		45	570	20		
3		45	570	30		
4		45	570	40		

Second Class

Group	Effort Force FE	Effort Distance dE	Resistance Force FR	Resistance Distance dR	mA (Actual)	mA (Calculated)
1		90	570	30		
2		90	570	40		
3		90	570	50		
4		90	570	60		

Third Class

Group	Effort Force FE	Effort Distance dE	Resistance Force FR	Resistance Distance dR	mA (Actual)	mA (Calculated)
1		30	570	90		
2		40	570	90		
3		50	570	90		
4		60	570	90		

Remember: the calculated mA always depends on the distances.

Remember: the actual mA always depends on the two forces.

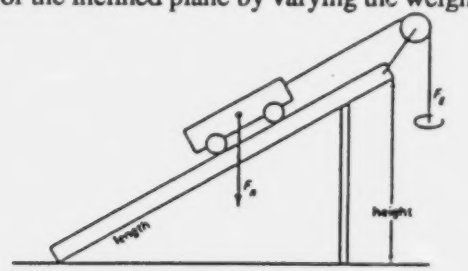
Lab 2: Inclined Plane

Equipment:

Board and pulley
Car = 190 g
Weights
String

Procedure:

Set up several trials of the inclined plane by varying the weights in the car and height of the plane.



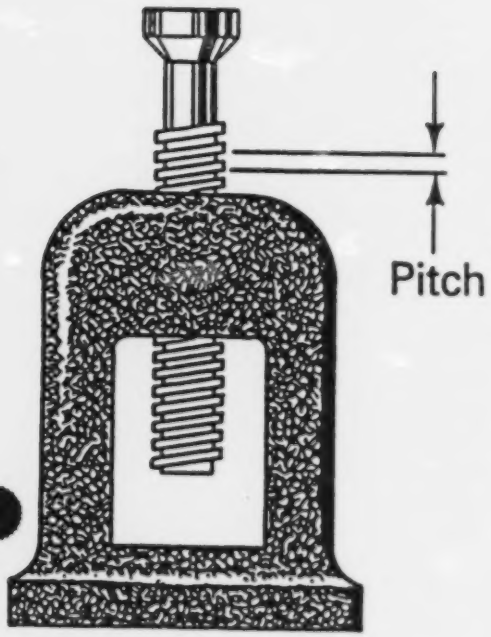
Measure the resistance force, effort force, resistance distance and effort distance. Find the actual and calculated mA.

Trial	Length of Plane	Height of Plane	Resistance Force FR	Effort Force FE	mA (Calculated)	mA (Actual)
1		10	Car +50			
		15	+50			
2		10	+100			
		15	+100			
3		10	+150			
		15	+150			
4		10	+200			
		15	+200			
5		5	+250			

Remember: the calculated mA always depends on the distances.

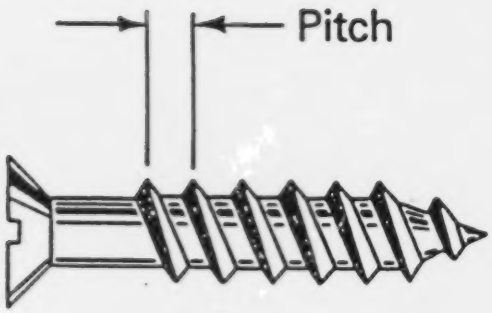
Remember: the actual mA always depends on the two forces.

The screw is



Jack screw

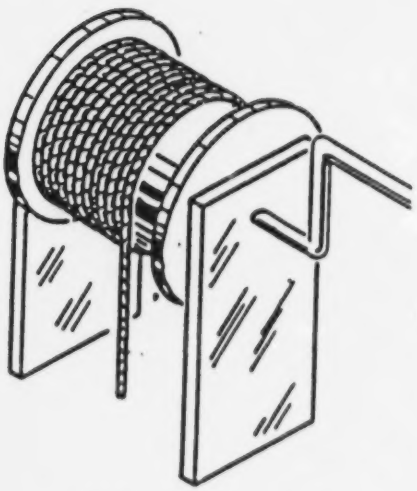
(a)



Wood screw

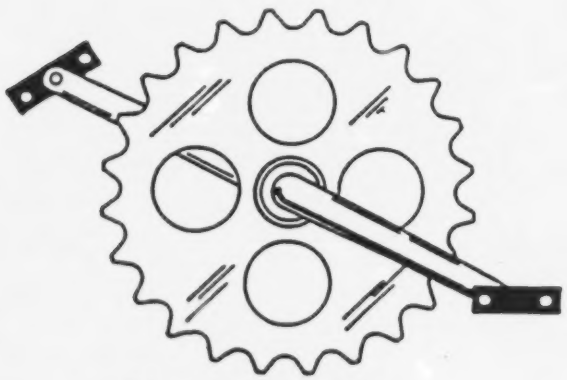
(b)

Examples of the Wheel and Axle



Winch

(a)



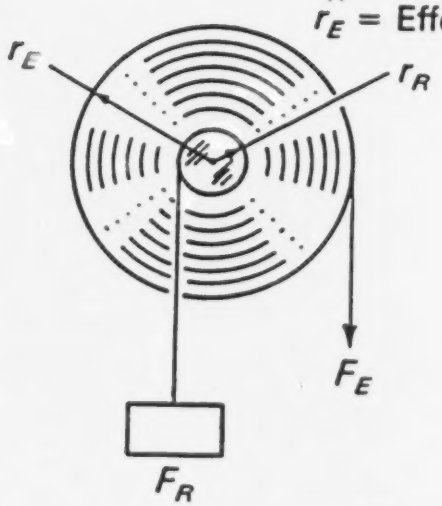
Bicycle sprocket
and pedal assembly

(b)

Steering wheel

(c)

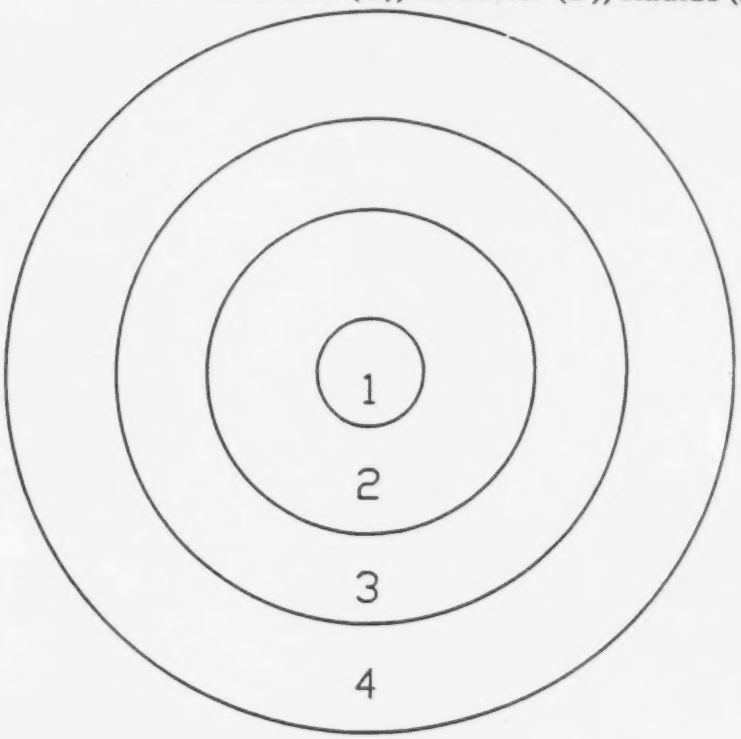
r_R = Resistance radius
r_E = Effort radius



(d)

Lab 3—Wheel and Axle

Circles:
Circumference (C), Diameter (D), Radius (R)



1. Make the following measurements in CM.
   A. Circumference of the actual apparatus and record.
   B. Diameter and radius from the above drawing?
2. Calculate the ratio in columns 4, 5 and 6.

	1	2	3	4	5	6
	C	D	R	C/D	Ratio	Ratio
1					D2/D1	R2/R1
2					D3/D2	R3/R2
3					D4/D3	R4/R3
4					D4/D1	R4/R1

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Lab 3 cont.

The purpose of this lab is to study the wheel and axle, pulleys and the screw.

Part I: Wheel and Axle

Equipment:

Wheel and axle apparatus (may have to be made)
Spring scale
Weights
String

Procedure:

Set up a wheel and axle situation as shown in Figure 1. Make one trial, using given weights. Then alter the apparatus as shown in Figure 2. Make one more trial. Compare the calculated mA with the actual mA.

Figure 1

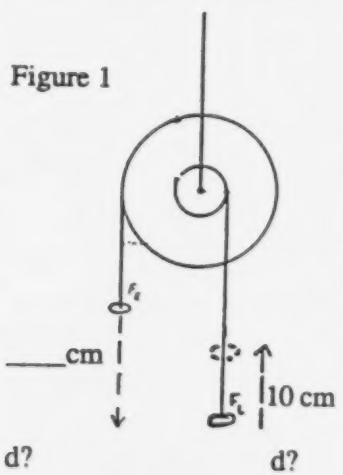
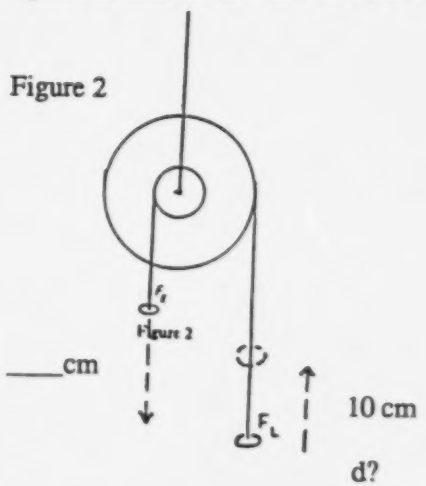


Figure 2

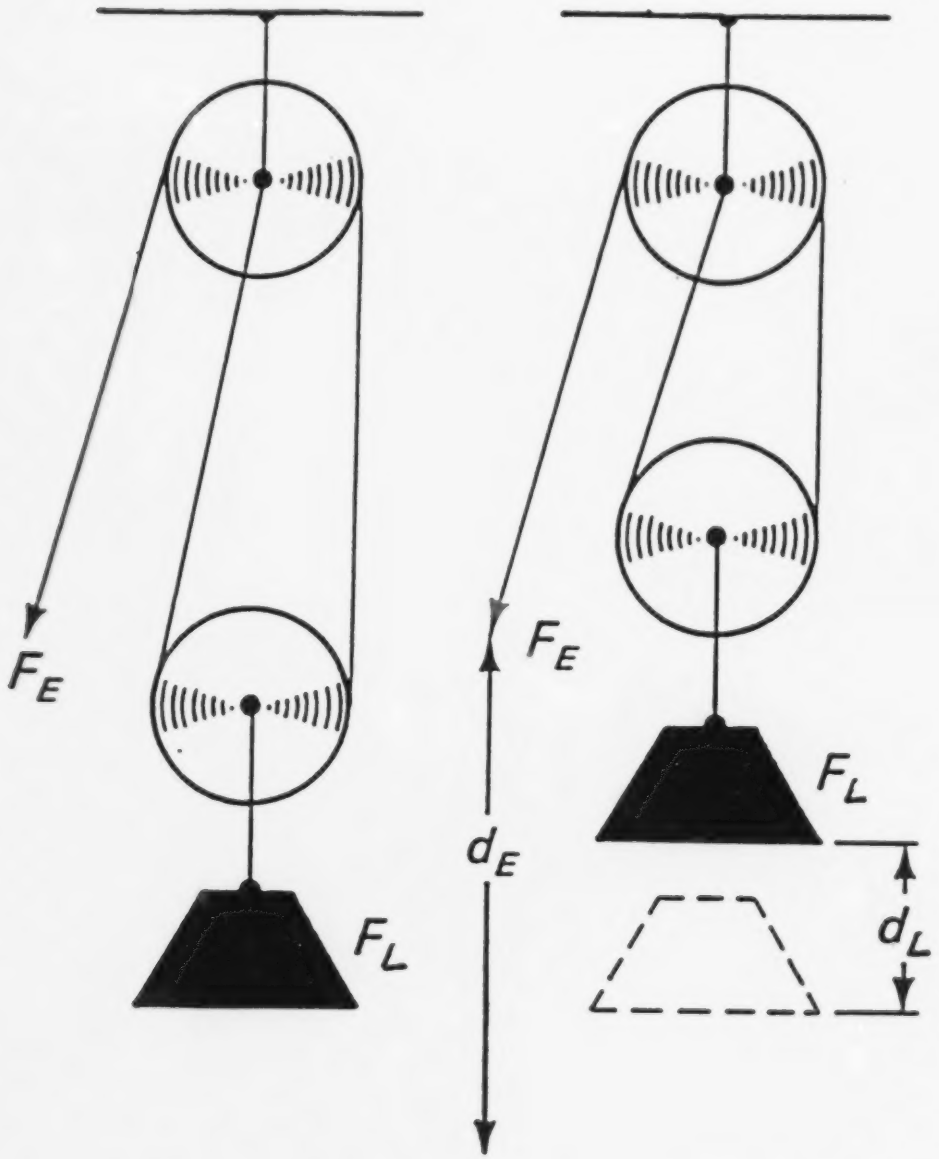


Group	Trial	Load Resistance Force FL	Effort Force FE	Load Resistance dL	rL	Effort dE	rE	mA (Calculated)	mA (Actual)
1	2/1			10					
	1/2			10					
2	3/2			10					
	2/3			10					
3	4/3			10					
	3/4			10					
4	4/1			10					
	1/4			10					

Lab 4—Pulleys

Law of simple machines applied to pulleys:

$$F_E \cdot d_E = F_E \cdot d_E$$



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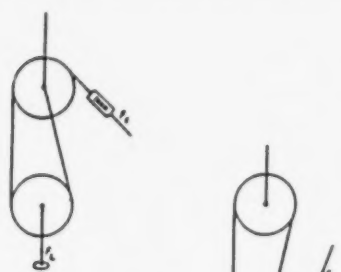
Part II: Pulleys

Equipment:

Pulleys
Spring scale
Weights
String

Procedure:

Set up some pulley systems as shown in the following figures or with available equipment, if different pulley systems are available. Measure the effort and resistance forces. Measure the distances the resistance and effort forces move in relation to each other.



Group 2

Group 3

Group 1

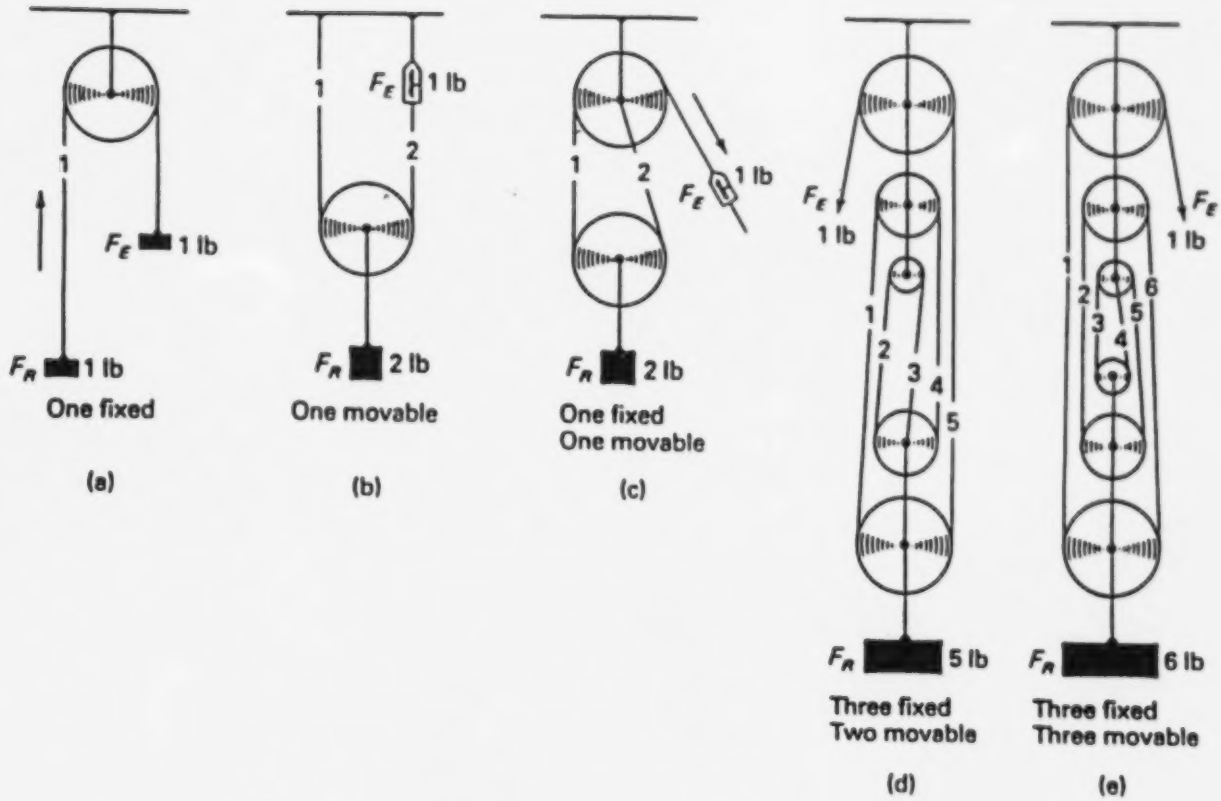
Group 4

Compare the calculated mA with the actual mA (using the resistance and effort forces).

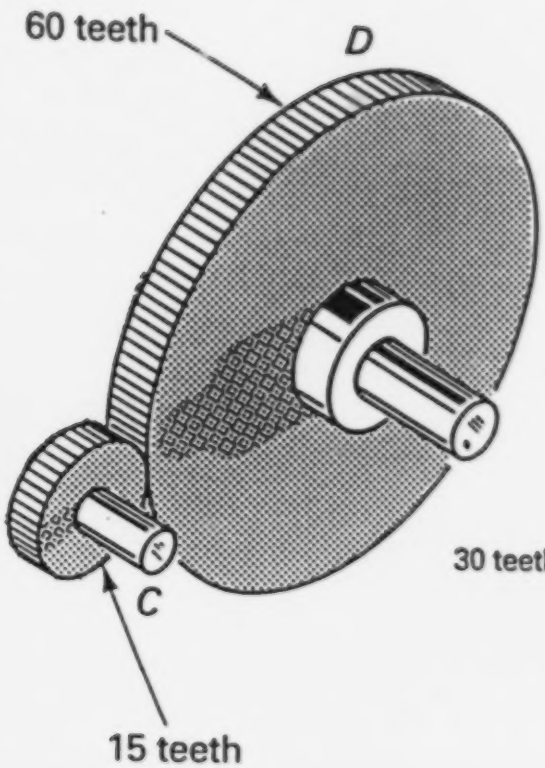
(Load)

Trial	Resistance Force FL	Effort Force FE	Resistance Distance dL	Effort Distance dE	mA (Calculated)	mA (Actual)
1			10			
2			10			
3			10			
4			10			
5						

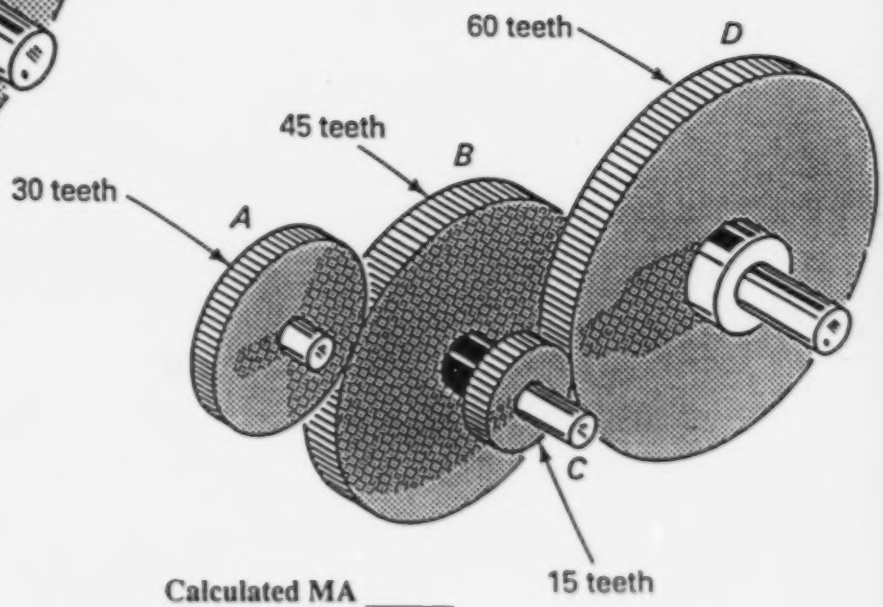
Pulleys and Pulley Systems



Lab 5—Gears



Calculated MA _____



Calculated MA _____

Module Overview

Task

Identify and discuss the basics of electricity, how it flows, why and through what. Apply this knowledge to basic circuits at home or at work.

Estimated Time

6 hours

Outline

1. Define Electricity
2. Define Basic Electrical Terms
   a. voltage
   b. ampere
   c. resistance
   d. wattage
3. Identify Schematics Diagrams
   a. battery
   b. resistor
   c. lamp
   d. conductor
   e. switch
   f. AC power source
4. Atomic Structure in Electricity
5. Conductors and Insulators
6. Ohm's Law
7. Power Laws
8. Difference Between AC and DC Voltage
9. Use of the VOM
10. Batteries and Their Effects
11. Battery Disposals

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12. Resistor Color Code

13. Simple Circuits
    a. series
    b. parallel
    c. series-parallel

14. Electrical Safety

Performance Objectives:

The student will be able to:

1. Define electricity.
2. Describe why, how and where electricity will flow.
3. Define basic electrical terms.
4. Identify parts of circuits.
5. Calculate values in circuits using Ohm's Law and power formulas.
6. Operate electronic test equipment to measure the values of voltage, current and resistance.
7. Test batteries.
8. Describe the resistor color code.
9. Determine the type of electrical circuit.
10. Work safely with electricity.
11. Effects of current through the body.

Activity Guide

Completed ✓	Learning Activities and Resources	
_____	1. Attend	Class lecture and discussion on electricity.
_____	2. View	*"Introduction toElectricity"* by Texas Instruments.
_____	3. Participate	Group discussion.
_____	4. Attend	Class lecture on electrical safety.
_____	5. View	*"Electrical Safety"* by CEV.
_____	6. Participate	Group discussions.
_____	7. Attend	Lab class using VOM.

Handouts:

a. Ohm's Law Worksheet
b. Safety First

Instructor Information

Electrical Lab

Lesson Performance Objective:
The student will demonstrate the ability to construct and test electronic circuits; along with increasing their knowledge about batteries, resistors and electrical safety.

Enabling Objective—The student will:

1. Understand the operation of the VOM and its correct use in testing electrical circuits.
2. Demonstrate the use of the VOM.
3. Demonstrate the skills to build the circuits requested by instructor.
4. List the safety precautions to be followed when working with electricity and follow these steps.

Required tools—Each station should be equipped with:

1. VOM
2. Several sets of test leads
3. Assorted resistors
4. Bread boarding system
5. Assorted batteries
6. Assorted conductors and insulators
7. Assorted wires
8. Lamps and lamp sockets (Low voltage type)

Preparation:
The instructor should arrange for the students to work in groups of two per station. In addition you may wish to have different values and wattages of the components selected.

Presentation:
The instructor should draw and demonstrate each circuit to construct and test—showing all of your calculations.

Electrical Lab Worksheet 1
The VOM and Its Use

Resistance: Using a meter to check resistance

1. What does the term resistance stand for?

2. Measure the dry skin resistance of your body from your right hand to your left. Record the value in the blank below.

   _____

3. Wet your finger tips and measure the skin's resistance across your right to left hands again. Record the value in the blank below.

   _____

4. Record the total change in resistance.

   _____

5. If you were to come in contact with a 120 volt AC power source, what amount of current would flow through the body at your dry skin resistance value. Use Ohm's Law to calculate this current.

   _____

6. What will be the amount of current when your skin is wet?

   _____

7. If the voltage increased to 220 volts, would the current increase or decrease?

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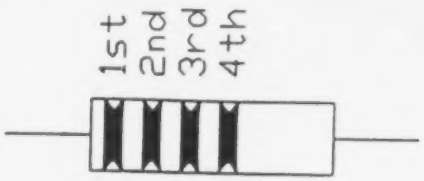
Color Code:

8. Use the color code to solve for the value of this resistor.

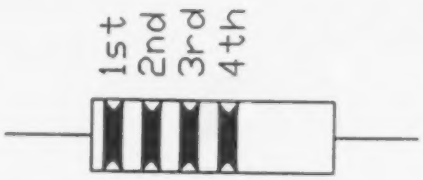
_____1st color
_____2nd color
_____3rd color = multiplier
_____4th color = tolerance



Measure and record the value of the resistor _____

9. Use the color code to solve for the value of this resistor.

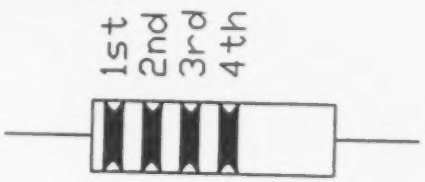
_____1st color
_____2nd color
_____3rd color = multiplier
_____4th color = tolerance



Measure and record the value of the resistor _____

10. Use the color code to solve for the value of this resistor.

_____1st color
_____2nd color
_____3rd color = multiplier
_____4th color = tolerance



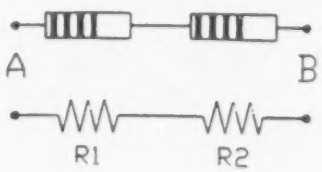
Measure and record the value of the resistor _____

Series Resistance:

11. Connect to resistors in series as shown below. Measure the value of R_1 and R_2 in the space provided. Then record the value of both resistors from point A to B in the blank. Record the total resistance.

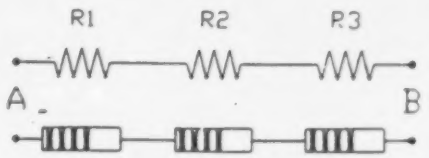
R_1 _____
R_2 _____

Total Resistance _____



12. Connect to resistors in series as shown below. Measure the value of R_1, R_2, R_3 in the space provided. Then record the value of both resistors from point A to B in the blank. Record the total resistance.

R_1 _____
R_2 _____
R_3 _____
Total resistance _____

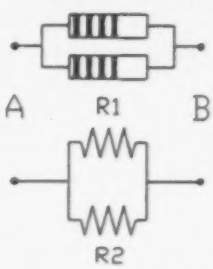


Parallel Resistance:

13. Connect to resistors in parallel as shown below. Measure the value of R_1 and R_2 in the space provided. Then record the value of both resistors from point A to B in the blank. Record the total resistance.

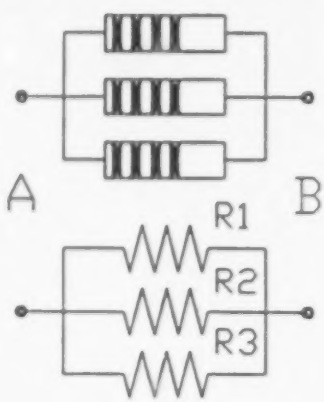
R_1 _____
R_2 _____

Total Resistance _____



14. Connect to resistors in parallel as shown below. Measure the value of R_1 and R_2 and R_3 in the space provided. Then record the value of both resistors from point A to B in the blank. Record the total resistance.

R_1 _____
R_2 _____
R_3 _____
Total Resistance _____



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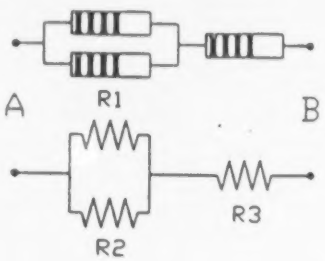
Series Parallel Resistances:

15. Connect the figure below as shown. Record the values of R_1, R_2, R_3 in the blanks provided. Then record the total resistance from A to B.

R_1 _____
R_2 _____
R_3 _____

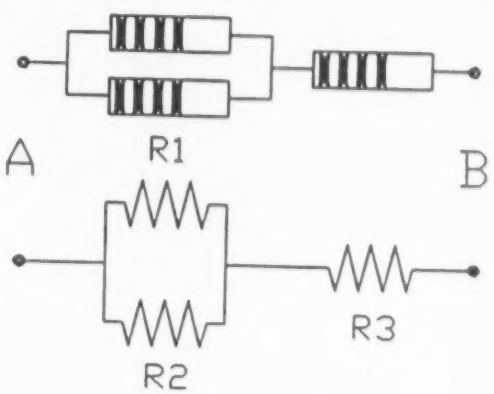
Total Resistance _____



16. Connect the figure below; changing the location of R_1 and R_2. Record the values of R_1, R_2, R_3 in the blanks provided. Record the total resistance from A to B

R_1 _____
R_2 _____
R_3 _____

Total Resistance _____



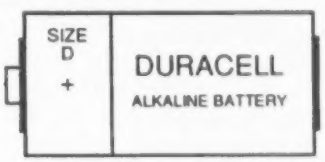
Electrical Lab Worksheet 2
The VOM and Its Use

Voltage and Current: Using a meter to measure both volts and amperes

1. What is voltage?

2. What is current?

3. Be sure to turn your meter to the range for testing voltage DC and check the voltage on a D-cell battery. Record this value below.

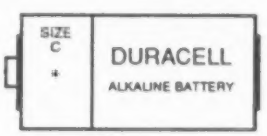


_____

4. Does this number change if you reverse the leads?

   Yes or No

5. Measure the voltage on a C-cell battery. Record the voltage in the blank below.



_____

6. Is there a difference in voltage between the C- and D-cell batteries you just tested?

7. What would be the advantage of using a D cell over a C cell?

8. Which end of the battery is the positive end?

9. Draw the schematic symbol for a battery.

10. How do you dispose of a battery?

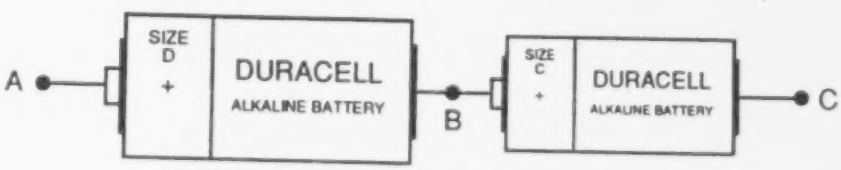
[Please remember that household batteries are the second largest category of hazardous waste. Please dispose of them properly.]

11. Connect the batteries so that the positive end of the first battery is touching the negative end of the second, then record the voltage from point A to point B, then B to point C then from A to point C.

C cell _____

D cell _____

Across both _____

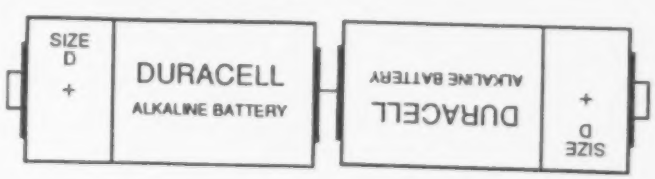


12. Now turn one of the batteries around, again measure the voltage across each battery, then across both of the cells. Record these values below.

D cell 1_____

D cell 2 _____

Across both _____



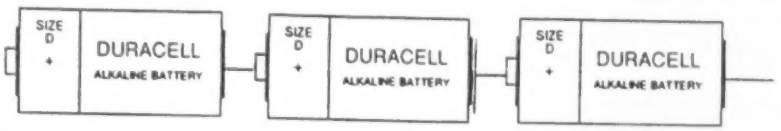
13. Add another battery to the two you already have, connect them so they are all positive to negative as shown below. Record their values.

1st cell _____

2nd cell _____

3rd cell _____

Across all _____



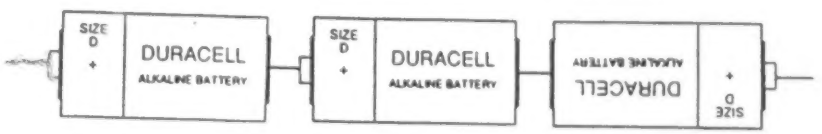
14. Now turn one of the batteries around as shown, Measure and record the values.

1st cell _____

2nd cell _____

3rd cell _____

Across all _____

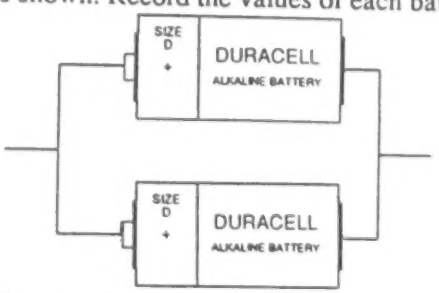


15. Place two batteries in parallel as shown. Record the values of each battery and across both cells.

1st cell _____

2nd cell _____

Across both _____



16. What would be the advantage of connecting batteries like this?

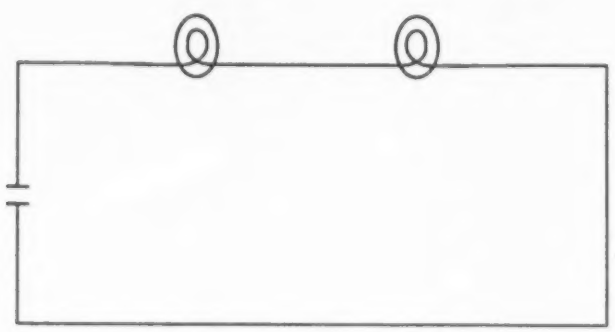
17. Measure and record the voltage on different types of batteries.

	Battery Name	Voltage
(example)	J cell	6 volts

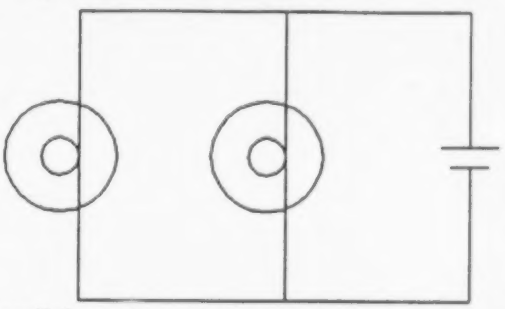
18. Connect your volt meter to a DC power supply, adjust the voltage control knob and watch the voltage change on the meter. What does the meter show?

19. Using a lamp and socket connected to this power supply, adjust the voltage and watch what happens. What in your home would this resemble?

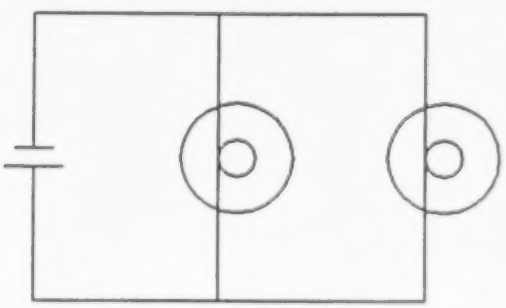
20. Connect the two lamps in series as shown. Increase the voltage until the lights are on, then break the circuit by removing any of the lamp leads. What happens in the circuit?



21. Reconnect the two lamps in series, as shown in question number 20, then increase the voltage to a point where the lights are on. Then remove the power supply by turning off the power or by disconnecting the leads. Now connect the lights in parallel to the same supply voltage. Are the lights brighter or dimmer? Why?



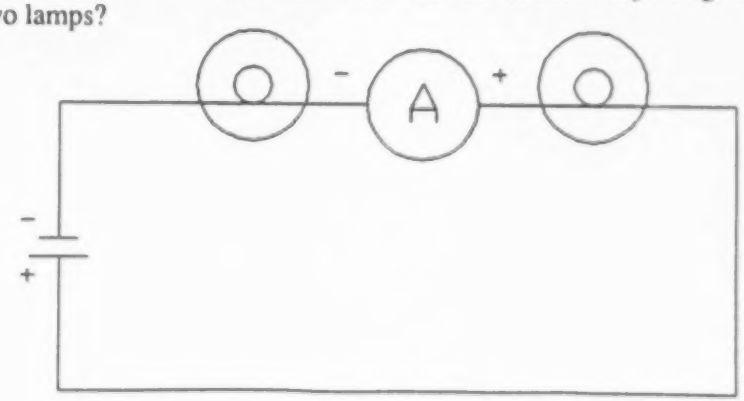
22. Connect the lights in parallel, as shown below. Adjust the voltage to a point where the lights are on. Remove one of the leads on one of the lamps. What happens to the other lamp? Why?



23. Connect the series circuit in question 21, but include a amp meter in series between the two lamps as shown. Have the instructor check out your circuit before turning on the power supply. Measure the amount of current in the circuit in the blank below. Can you figure out the resistance of the two lamps?

Current _____

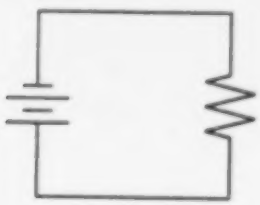
Resistance _____



Ohm's Law Worksheet

Solve for the missing information using Ohm's Law:

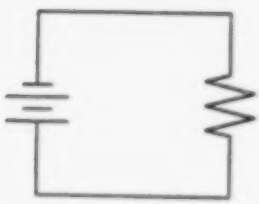
1. 10 V



I = ?

5 ohm

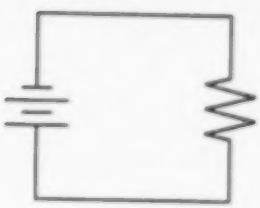
2. 100V



I = ?

20 ohm

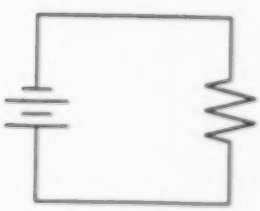
3. 60V



R = ?

3 amperes

4. 50V

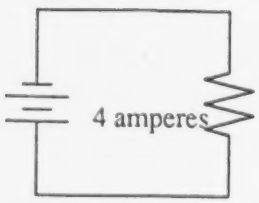


I = ?

30 ohm

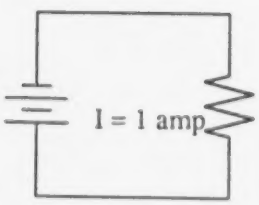
Ohm's Law Worksheet

continued...

5. 

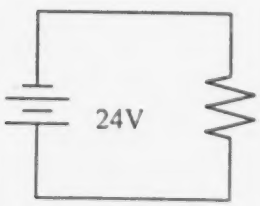
E = ?

R = 35 ohm

6. 

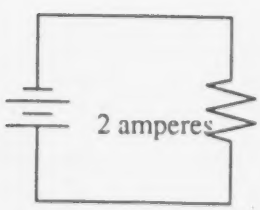
E = ?

R = 150 ohm

7. 

R = ?

1.5 amps

8. 

E = ?

125 ohm

Safety First

"I'm a Believer!"

Fox Valley Technical College
Technical Division
Electrical-Electronics

Electrical Circuits I
Introduction and Safety

Electric Shock

Electrical Shock: All voltages are dangerous.

Electric Shock: The effect that occurs when current is passed through the human body. The effect could be one or a combination of many things from a slight tingle to death.

Electrical shock can occur as a result of human error, electrical faults, poor design of equipment or a combination of these and other things.

The severity of an electrical shock will vary somewhat with age, sex and the physical condition of one's body. The intensity of the shock, be it injury or death, is determined by the amount of current, the current path through the body, and the amount of time the current is allowed to flow. Some individuals have survived shocks where high voltage (several thousand volts) was involved, while others became a fatality when contact was made with voltages of 50 volts or less. The common household voltage (110-120 volts) can be fatal under the right circumstances.

Electricity damages the body in at least three ways. It harms or interrupts the proper functioning of the nervous system and heart, it subjects the body to intense heat and it causes the body muscles to contract.

As current values continue beyond those where a tingle is felt, the body reacts in different ways and the shock becomes more severe. Current values of 10 to 20 mA., will cause involuntary contraction of one's muscles. The person may not be able to release the handhold on the conductor and death could result if help is not available.

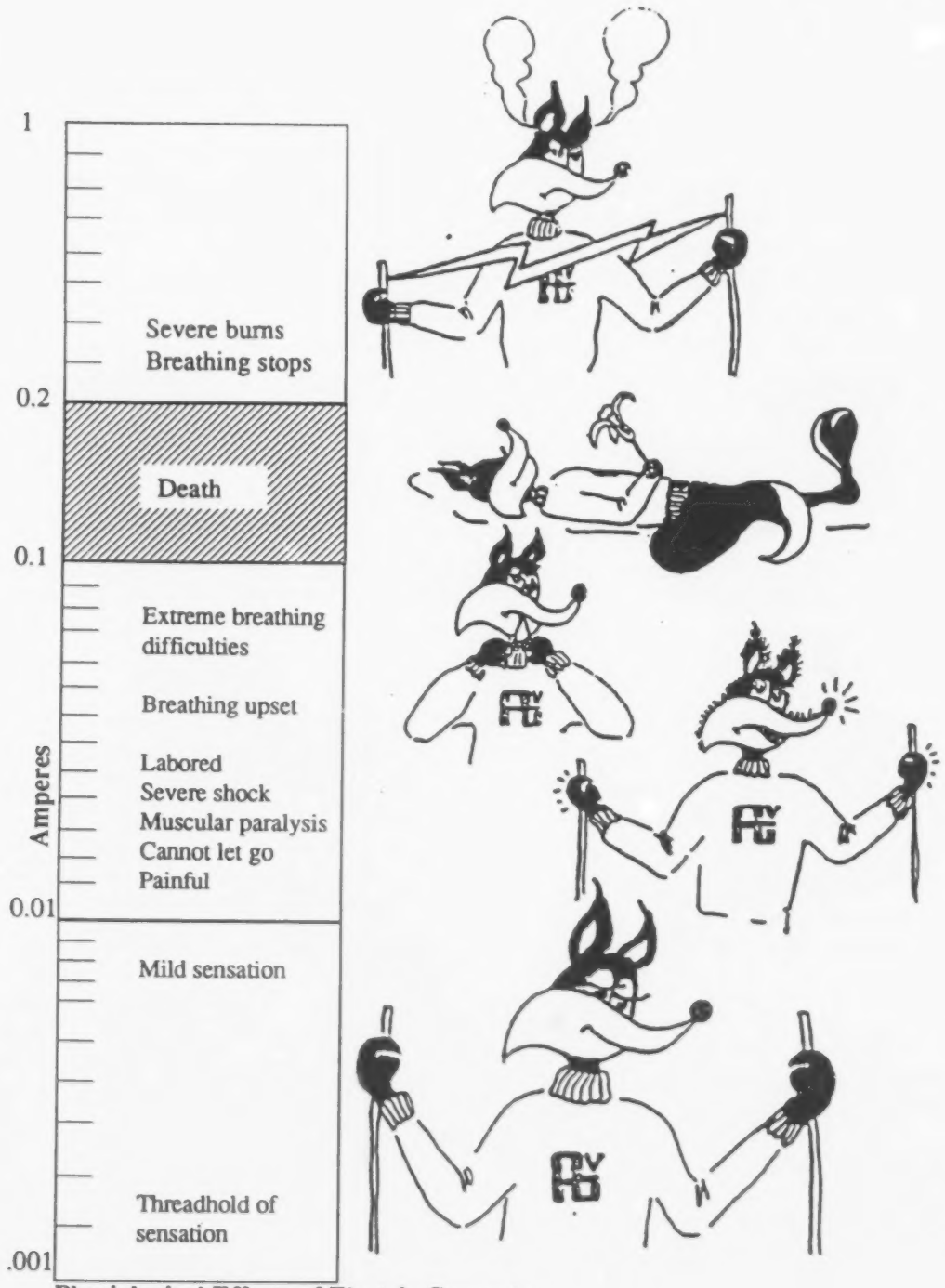
Continual increase of current levels will interfere with the normal bodily functions of breathing and coordinated heart motions. Breathing becomes labored and may stop at values below 75 mA. This is often referred to as "respiratory-center paralysis." If the body experiences currents of 100 mA or more, the heart will probably fibrillate. This is an uncoordinated or loss of the heart's rhythmic beating. The heart, being a great pump, cannot pump evenly and it also beats too fast so blood flow to vital organs decreases considerably. Death can occur shortly unless the current is halted. This is

called "ventricular fibrillation." It is possible to have both "ventricular fibrillation" and "respiratory center paralysis" occurring at the same time. If higher currents, such as 200-300 mA or more are involved, the shock is so severe that the heart will stop immediately and fibrillation will not take place. If the current is removed immediately, the heart may resume its normal beating pattern. If breathing has stopped, the person needs artificial respiration immediately and could survive the shock with little heart or respiratory damage. Time delay in applying artificial respiration is critical. In one study, about three out of four who received artificial respiration within three minutes lived, but less than 15 percent survived who received it within four minutes of the shock. The person in either situation may have received severe burns and must be treated accordingly.

Alternating current is more dangerous than direct current and the 60 hertz (cycle) current of the power line is more dangerous than high frequency alternating current.

Remember—it is the current that does the damage and not the voltage. There must be voltage to have current flow and the amount of current is determined by the resistance in the current path. Ohm's Law is used to calculate the current and it states that current = voltage/resistance. Since very small values of current can be dangerous, the equation shows that if resistance is very small, it does not require much voltage to cause damaging current values. Practicing safe working habits will reduce one's chances of electrical shock.

Prevention is the best medicine for electrical shock. You must respect all voltage and practice safety procedures when working on and with electrical-electronic equipment.



Physiological Effects of Electric Currents

Figure 1

Safety Guidelines

You may have had some experience in the use of electrical equipment and safety procedures. However, since observing safety practices is a lifelong process, periodic review of the basic principles is mandatory even for the most experienced. In fact, the better your observation of safety practices, the longer your "lifelong process" is likely to continue. The primary objectives of any safety practice are prevention of personal injury and prevention of damage to equipment—in that order. If necessary, equipment can be replaced; human life and limbs cannot. Never risk damage to yourself or someone else to prevent damage to equipment.

General Precautions

The user of electricity is exposed to many potentially dangerous conditions in the course of his/her daily work. You are exposed to many of these same hazards in your laboratory classes. No training manual, no set of rules or regulations, no list of the hazards can make working conditions completely safe. However, it is possible to work with electrical and mechanical equipment without serious accident or injury as long as you are aware of the main sources of danger and remain constantly alert to them. This requires not only taking the proper precautions and practicing the basic rules of safety, but being safety conscious at all times so that these precautions and rules become second nature to you.

The two requirements for safety are common sense and good judgment. Modern electronic equipment is provided with guards and protective devices designed to make operation as safe as possible. However, statistics show that nearly 85 percent of all accidents in schools and industrial plants are due to causes that cannot be guarded against by mechanical devices. The chief cause of all preventable accidents is carelessness. Carelessness causes accidents not only in work situations, but also in the operation of automobiles, farming equipment and home appliances. Most accidents are the result of someone's thoughtlessness or lack of consideration for others.

It is your responsibility not only to protect yourself by developing the habit of thinking before doing, but to protect others from any danger you can prevent.

The following general precautions should be taken at all times:

1. Report any condition, equipment or material that you consider unsafe.

2. Warn others who are endangering themselves by failure to observe safety precautions.

3. Always use the protective clothing or equipment required for safe performance of any job.

General Precautions continued...

4. Report any injury or illness that occurs during the course of your work.

5. Approach any unforeseen situation or condition with caution.

6. In case of electrical shock, know exactly what to do and take the necessary steps at once.

Effects of Electric Shock

Electric shock is a jarring, shaking sensation resulting from contact with electric circuits or with lighting. The victim usually feels that he/she has received a sudden blow; if the voltage and resulting current are sufficiently high, he/she may become unconscious. Severe burns may appear on the skin at the place of contact and the victim's hand muscles may contract so that he/she is unable to let go of the wire causing shock.

Body resistance varies from 1,000 Ω to 500,000 Ω for unbroken, dry skin. Resistance is lowered by moisture and high voltage and is highest with dry skin and low voltage. Breaks, cuts or burns may lower body resistance. A current of 1 mA (one-thousandth of an ampere) will cause a sensation of shock. Current as low as 5 mA can be dangerous. If the palm of your hand makes contact with the conductor, a current of about 12 mA will cause the hand muscles to contract, freezing your body to the conductor. Such a shock may or may not cause serious injury, depending on the contact time and your physical condition, particularly the condition of your heart. A current of only 25 mA has been known to be fatal; 100 mA is usually fatal.

Because of the physiological and chemical nature of the human body, *five times more direct current* than alternating current is needed to freeze the body to an electric conductor. One of the most dangerous AC frequencies is 60 Hz (cycles per second). Unfortunately, this is the frequency normally used in residential, commercial and industrial power lines.

The damage from shock also depends on the number of vital organs in the current path and especially on the amount of current that reaches the heart.

Ventricular fibrillation of the heart occurs when the current through the body approaches 100 mA. Ventricular fibrillation, which is uncoordinated action of the walls of the ventricles, causes the heart to lose its regular pumping action. Fibrillation will usually continue until some action is taken to restore the regular heartbeat.

Currents between 100 and 200 mA are lethal. However, currents *over* 200 mA usually do not cause death if the victim is given immediate attention; these high current clamp the heart muscles and prevent ventricular fibrillation. Such currents will cause severe burns and unconsciousness, but the victim will usually respond to artificial respiration. When a person is rendered unconscious by a current passing through his/her body, it is impossible to tell how much current caused the unconsciousness. Artificial respiration must always be applied immediately if breathing has stopped.

Treatment of Electric Shock

Familiarize yourself with the following procedures for the rescue and care of shock victim:

1. Remove the victim from electrical contact at once, but do not endanger yourself.
   a. Throw the switch if it is nearby.

   b. If no switch is nearby, cut the cable or wires to the apparatus using an ax with a wooden handle. Be careful to protect your eyes from the flash when the wires are severed.

   c. If you are unable to deenergize the equipment immediately, use a dry stick, rope, belt, coat, blanket or any other nonconductor of electricity to drag or push the victim to safety.

2. Determine whether the victim is breathing. Keep him/her lying down in a comfortable position and loosen the clothing about the neck, chest and abdomen so that he/she can breathe freely. Protect him/her from exposure to cold and watch him/her carefully.

3. If the victim is breathing, treat him/her for traumatic shock. Keep the victim quiet and warm (but not hot). Cover him/her with a coat or blanket to conserve body heat and elevate the feet slightly (12 to 18 inches). Treat any visible burns and stop any visible hemorrhaging. Some traumatic shock (often called "shock of injury") is always present in injury cases and sometimes does not develop immediately. It frequently causes death even though the injury itself was not fatal.

4. Keep the victim quiet and prevent him/her from moving about. After electric shock, the heart is very weak and any sudden muscular effort of activity may result in heart failure. After a severe electric shock, patients sometimes die from the effects of shock or injury after they have been revived.

5. Do not give stimulants or opiates. Send for a doctor at once and do not leave the victim until he/she has adequate medical care.

6. If the victim is not breathing, it is essential to apply artificial respiration without delay, even though he/she may appear to be lifeless. Although there have been some exceptions in general the brain and nervous system can be restored to normal function only if the air and blood circulation have not been stopped for longer than five minutes. *Do not stop artificial respiration until medical authority pronounces the victim beyond help.*

Basic Precautions

Every person who works with electrical equipment should be constantly alert to the hazards to which he/she may be exposed and be capable of rendering first aid in case of injury. Carelessness or thoughtlessness can result in serious injury or death not only from shock but from burns, flying objects or fire. Many pieces of equipment or work situations require specific precautionary measures. There are some fundamental precautions, however, that apply in working with or around any electrical equipment.

Whenever you are working around electrical equipment, avoid loose or flapping clothing and remove any flammable articles. Be sure you are not standing on any metal. Check to see that your shoes don't have metal plates or cleats and, if possible, wear shoes with rubber or crepe soles. Remove all rings, wristwatches or metal chains. Be sure your clothing has no exposed metal zippers , buttons or other fasteners. Keep your clothing, hands and feet dry. If you have to do any work in a wet or damp location, sit or stand on a dry wooden platform or stool and put a rubber mat on top of the wood. Be sure that the material is actually nonconducting. Not all so-called rubber mats are good insulators. Wear rubber gloves and use insulated tools and insulated flashlight of the molded type.

Before you begin work on any electrical equipment, take time for a careful study of the schematics and wiring diagrams of the entire system, noting what circuits must be deenergized in addition to the main power supply. Remember that electrical equipment frequently has more than one source of power and opening supply switches will not necessarily kill all circuits in a piece of equipment. A danger that is often overlooked—sometimes with tragic results—is the input to electrical equipment from other voltage sources, such as synchros and remote-control circuits. For example, turning off the antenna safety switches will disable the antenna, but it may not turn off the antenna synchro voltages from other sources. Moreover, the rescue of a victim shocked by the power input from a remote source is often hampered because of the time required to locate the source of power and turn it off. Be sure you turn off *all* power inputs before working on equipment.

Although voltages below 50 V are considered low voltages, treat all voltages with respect. Voltages between 50 and 220 V are medium voltages, but any voltage in excess of 50 V must be considered hazardous to life. The common 120-V household power supply has caused the greatest number of deaths from electric shock. Voltages of 220 V and higher are considered high voltages and require special precautions.

Never work alone around high-voltage circuits; have another person (safety observer) who is qualified in first aid for electric shock present at all times. Be sure he/she knows the circuits and locations of switches controlling the equipment so he/she can pull the switch immediately if anything unforeseen happens. Warning signs and suitable guards should be provided to prevent any accidental contact with high voltages.

Do not expose equipment unnecessarily, even in a dead circuit. Keep the doors to switch and fuse boxes closed except when you are working inside them or replacing fuses. Avoid any direct contact with exposed equipment. If you do have to touch it, use only one hand.

Use one had to open and close circuit switches. Keep the other hand behind you or in your pocket, so that there is no danger of accidentally touching an energized circuits with both hands at once.

Before you touch a capacitor or any part of a circuit that is likely to be connected to a capacitor (whether the circuit is deenergized or disconnected entirely), short the terminals of the capacitor to make sure it is completely discharged. Shorting sticks like the one shown in Figure 1 should be permanently attached to a ground connection on workbenches where high-voltage electrical equipment is regularly serviced.

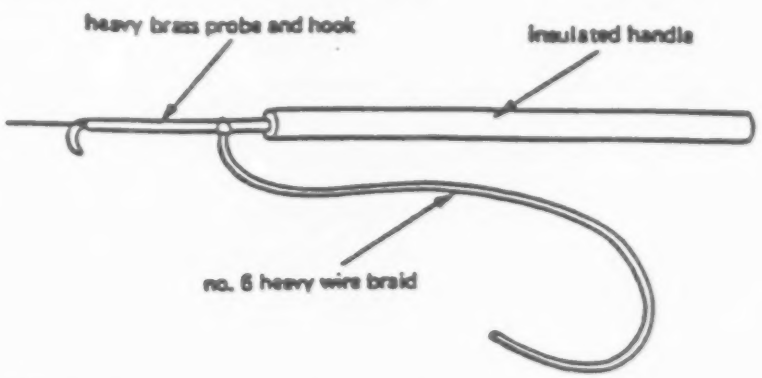


Figure 1 shorting stick

Make certain that all test equipment is properly grounded.

Turn off the power before you connect alligator clips to any circuit.

When you are making measurements in circuits with voltages over 30 V, do not hold the test probes or touch any part of the test equipment while the circuits are energized.

Module Overview

Task Identify and discuss the basics of electrical wiring, code and a study of electricity in the home or work place.

Estimated Time: 3 hours

Outline

1. Basic Electrical History
2. Define Electrical Code
3. Identify Electrical Agencies
4. Identify Different Types of Wiring
   a. knob and tube
   b. nonmetallic
   c. BX
5. Conductors and Insulators
6. Difference between AC Low and High Voltage
7. Explain Power Distribution Systems
8. Explain Residential Wiring Systems
9. Safety Features of (GFCI's)
10. Use of the Voltage Testers
11. Electrical Products
    a. switches
    b. lamps and light fixtures
    c. receptacals
    d. breaker boxes
    e. ground-fault, circuit interrupters

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12. Simple Circuits Wiring (with proper supervision)
    a. GFCI's
    b. Three-way Circuits

13. Electrical Safety

Performance Objectives *The student will be able to:*

1. Explain why and how electricity will flow through the home.
2. Describe basic electrical power distribution in the home.
3. The basics of residential wiring systems.
4. Identify parts of circuits.
5. Operate electrical test equipment.
6. Relate history of electrical wiring.
7. The limits of electrical wiring.
8. Identify electrical products and describe their UL labeling.
9. Determine the type of electrical circuits.
10. Work safely with electricity.
11. Describe the effects of current through the body.
12. Explain proper use of electrical hand tools.

Activity Guide

Completed ✓		Learning Activities and Resources
_____	1. Attend	Class lecture and discussion on electrical wiring and history.
_____	2. Participate	Group discussions.
_____	3. Attend	Class lecture on electrical safety and equipment.
_____	4. Participate	Group discussion.
_____	5. Attend	Lab class using basic electrical tools and equipment.

Instructor Information
Electrical Lab

Lesson Performance Objective:
The student will demonstrate the ability to construct and test electrical circuits—along with increasing their knowledge on handtools, GFCI's, switches, light receptacles and electrical safety.

Enabling Objective—The student will:

1. Understand the operation of basic electrical tools and their correct use in testing and building electrical circuits.

2. Demonstrate the use of the electrical test equipment.

3. Demonstrate the skills to build the circuits requested by the instructor.

4. List the safety precautions to be followed when working with electricity and follow these steps.

Required tools—Each station should be equipped with:

1. Breaker box
2. Assorted breakers
3. Assorted switches
4. Electrical wiring system
5. Assorted connectors
6. Assorted conductors and insulators
7. GFCI's
8. Lamps and lamp sockets
9. Basic electrical tools

Preparation:
The instructor should arrange for the students to work in groups of two per station.

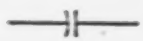
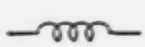
Presentation
The instructor should draw and demonstrate each circuit to construct and test.

Electrical/Electronic Aptitude Test

1. Which of the following equations illustrates Ohm's Law?

   A. Power X Inductance = Resistance
   B. Current X Resistance = Voltage
   C. Voltage X Power = Capacitance

2. The schematic symbol for a resistor is:

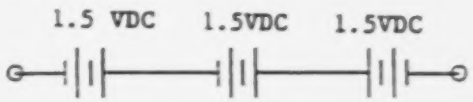
   A. B.  C. 

3. Standard household voltage from a receptacle is which of the following:

   A. 280 VAC
   B. 120 VAC
   C. 28 VAC

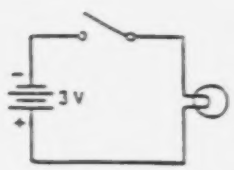
4. What is the voltage across the following batteries:

   A. 4.5 VDC
   B. 3.0 VDC
   C. 1.5 VDC



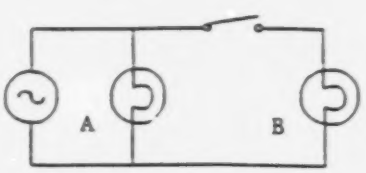
5. Is the light on or off in the following circuit?

   A. On
   B. Off
   C. Can't tell (not enough information)



6. Which light or lights are on?

   A. A
   B. B
   C. Both A & B



7. This picture is of a:

   A. 3-way switch
   B. 2-way switch
   C. Push button switch

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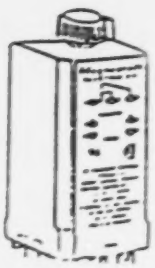
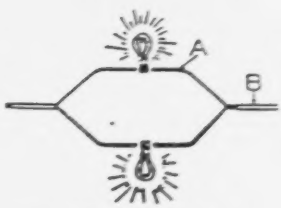
8. The following is a:



A. Relay
B. Drum switch
C. Voltage control oscillator

9. Which wire carries more current?

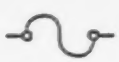


A. A
B. B
C. Both have the same

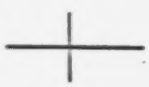
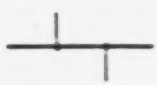
10. 120 volt AC receptacle produce which output frequency?

A. 1000 hertz
B. 120 hertz
C. 60 hertz

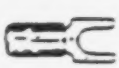
11. Which of the following doesn't show a fuse?

A.
B. 
C.

12. Which wires are connected together?

A. 
B. 
C.

13. Which of the following is not an electrical connector:

A.
B. 
C.

14. Which item listed is not an insulator:

A. Wood
B. Water
C. Rubber

15. A tachometer measures?

    A. Temperature
    B. Speed
    C. Flow

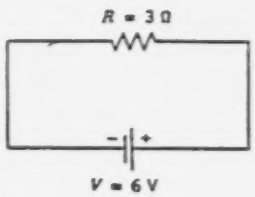
16. The term AC refers to:

    A. Alternating current
    B. Alternating circuit
    C. Affective current

17. How much current in amps is needed to kill:

    A. .001 amp
    B. .1 amp
    C. 1 amp

18. What is the current in the following circuit?



    A. I = .5 amp
    B. I = 18 amps
    C. I = 2 amps

19. A standard car batteries voltage is:

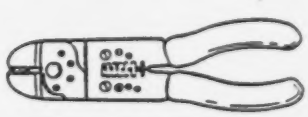
    A. 6 volts DC
    B. 12 volts AC
    C. 12 volts DC

20. Which end of this battery is the positive terminal?

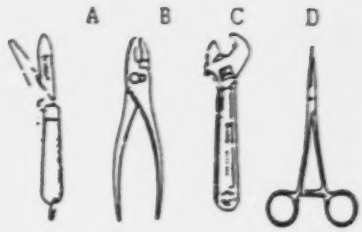
    A. A
    B. B
    C. Neither

21. This tool is called a:

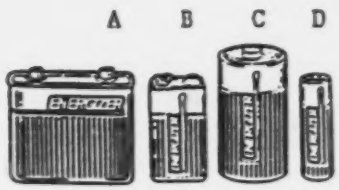
    A. Crimp Tool
    B. Bondhus
    C. Wire Wrap Tool



22. What item might best be used as a heat sink?

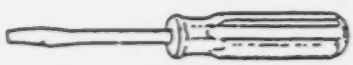


23. Which battery would read 9 volts:



24. This is what type of screwdriver?

A. Torx Head
B. Phillips
C. Flat Blade



25. Resistance is measured in the unit of:

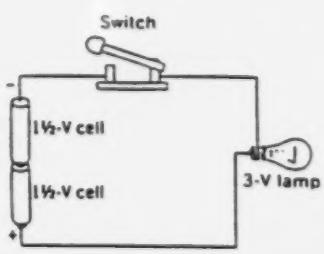
A. Henry
B. Ohm
C. Farad

26. Two negative charged metal balls would:

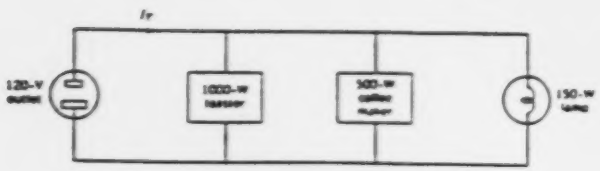
A. Attract one another
B. Repel one another
C. Neither repel or attract each other

27. What type of circuit is the following?

A. Parallel
B. Neutral
C. Series



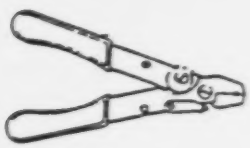
28. Which would cost more to operate?



A B C

29. This tool is a:

A. Dykes
B. Linemans pliers
C. Wire stripper



30. The term DC stands for:

A. Delay Current
B. Direct Current
C. Display Current

31. The purpose of a fan on a machine is to:

A. Cool the equipment
B. Keep dust off unit
C. Show use is powered up

32. What is this?

A. Fuse
B. Resistor
C. Belden

33. Which is not a relay?

A.
B.
C.

A B C

34. The picture shows a:

A. Digital clamp on ampmeter
B. Digital multimeter
C. Analog multimeter

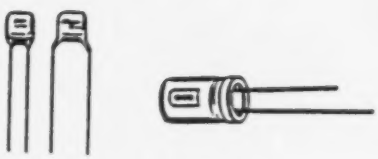
35. What is this tool?

A. Heat gun
B. Soldering pencil
C. Hot knife

36. Electronic sensors would be used for:

A. Inputs to a machine
B. Outputs to a machine
C. Power source to a machine

37. What is shown in these pictures?



A. Inductor
B. Crystal
C. Capacitor

38. Resistors are selected for their:

A. Wattage
B. Color
C. Capacitance

39. A volt-ohm-meter is to be connected in a _____ to read current in a series circuit.

A. Parallel
B. Series
C. Series/Parallel

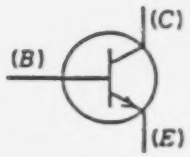
40. Transformers are used to:

A. Step up/down current or voltage
B. Increase power in circuit
C. To amplify output gain

41. This is a symbol for a:

A. Push button switch
B. Toggle switch
C. Double pole double throw switch

42. This is the symbol for a:



A. Amplifier
B. Transistor
C. Diode

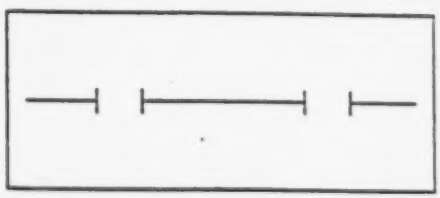
43. A circuit breaker limits the amount of _____ to a circuit.

A. Voltage
B. Current
C. Resistance

44. Show is a picture of a:

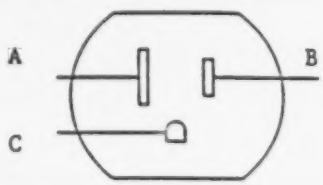
A. Silicon Control Relay
B. Triac
C. Integrated Circuit

45. This represents a/an:



A. "And" statement
B. "Or" statement
C. "Nor" statement

46. This part of the receptacle is for the ground leg of the circuit:



A. A
B. B
C. C

47. Conductive wrist straps are used to protect electronics components from:

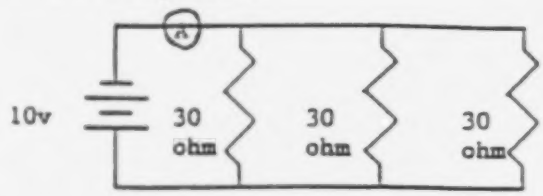
A. Metal oxide versistors
B. Electro Static Discharge
C. Heat

48. Shown is a picture of a:

A. Ring tongue terminal
B. Spade tongue terminal
C. Butt connector

49. What is the current in this circuit at the amp meter?

A. .33 amp
B. .1 amp
C. 1 amp

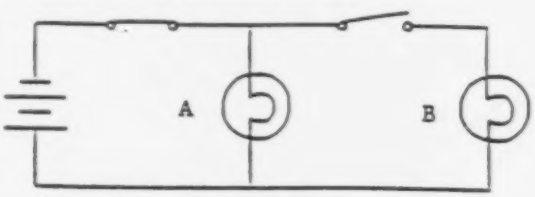


50. Sensors work as a:

A. Switch
B. Motor
C. Fuse

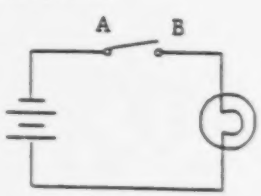
51. If I wanted light B to light, would you have to close switch:

A. A
B. B
C. Both A and B



52. If the switch is open the voltage between points A and B is:

A. Zero volt
B. Supply voltage
C. Between zero and supply voltage



53. What is the better conductor:

A. Copper
B. Aluminum
C. Silver

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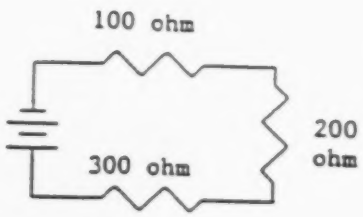
54. What is not a type of light?

A. Neon
B. Incandescent
C. Annunciator

55. Which is a not a ground symbol?

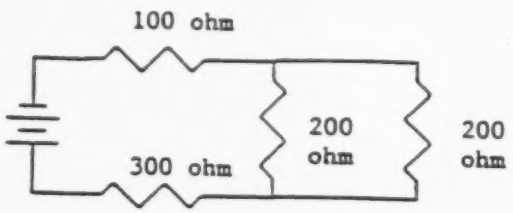
A. B. C.

56. What is the total resistance of this circuit?



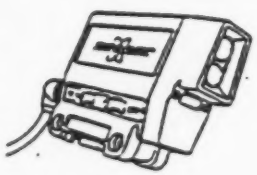
A. 300 Ω
B. 600 Ω
C. 1200 Ω

57. What is the total resistance of this circuit?



A. 300 Ω
B. 500 Ω
C. 400 Ω

58. What type of sensor is shown?



A. Inductance
B. Photoelectric
C. Proximity

59. Electricity is the flow of:

A. Atoms
B. Electrons
C. Protons

60. If your household voltage were to increase from 120 volts to 150 volts the lights will glow?

A. More brightly
B. Less brightly
C. Not change

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Equity/Equality

Training

EQUITY/EQUALITY: TRAINING FOR THE FUTURE

Course Description

This course provides the student with information on the legal requirements for equal opportunity in education and employment; prohibited forms of discrimination and harassment and the legal consequences for employers and individuals; and gender equity. The course is intended to familiarize the student with his/her rights and responsibilities in the world of education and work in order to be more effective as an employee and a student.

Credits

Associate degree and vocational diploma program students will complete this three hour block as a part of other program course requirements. There are three parts:

- Part I - Major Civil Rights Laws Impacting Employment and Education
- Part II - Sexual Harassment
- Part III - Equity

Pre-requisites

There are no pre-requisites. It is recommended that a program student complete this block within the first semester of his/her program of study.

Textbooks

The following materials can be found on reserve in the college library:

1. Various reference handouts as indicated in the readings
2. Riley, L., Baldus, L., Nelson, O., Schuler, B., Keyes, M. "My Worst Nightmare". First ed. Center for Vocational, Technical and Adult Education, University of Wisconsin-Stout, Menomonie, Wisconsin. 1993.

COMPETENCIES

Part 1 - Major Civil Rights Laws Impacting Employment and Education

Module 1 Name and distinguish between existing federal and state laws which impact employment and education

Module 2 Relate federal and state laws to an educational setting

Part 2 - Sexual Harassment

Module 1 Trace the emergence of the Equal Employment Opportunity Commission's (EEOC) guidelines for sexual harassment.

Part 3 - Equity

Module 1 Assess the impact of bias and stereotyping on the workplace, career selection, and college program enrollments.

Module 2 Recommend individual solutions to overcome personal bias and stereotypical behavior at work and in school.

PART I - MAJOR CIVIL RIGHTS LAWS IMPACTING EMPLOYMENT AND EDUCATION

Module 1

Competency

- Name and distinguish between existing federal civil rights and state laws which impact employment and education.

Objectives

1. Identify and compare the following laws:
   a. Title VII of the Civil Rights Act of 1964
   b. Title IX of the Educational Amendment Act of 1972
   c. Americans with Disabilities Act (ADA)
   d. Wisconsin Fair Employment Act
2. Separate laws directly related to employment from those which apply to educational institutions.
3. Identify laws which apply to both employment and education.
4. Identify the agency responsible to enforce each law.
5. Identify what groups are protected by each law.

Learning Activities

1. Read the handouts provided for this module.
2. Complete the worksheet provided for objectives 2, 3, 4, and 5.
3. Review the college's affirmative action policy and the policy prohibiting discrimination and harassment of students.

Evaluation

Be prepared to discuss and give examples of illegal discrimination in the workplace and/or in educational institutions.

PART III - EQUITY

Module 1

Competency

- Assess the impact of bias and stereotyping in the workplace, career selection, and college program enrollments.

Objectives

1. Compare earnings of men and women employed in the 1990's.
2. Identify careers dominated by men, by women.
3. Recognize gender bias in printed materials, speech, and attitudes.
4. Identify stereotypes.
5. Differentiate between myth and reality.

Learning Activities

1. Read the handouts provided with this module.
2. Compare the number of male and female students enrolled in technical programs; in health occupations programs.
3. Select five (5) brochures used to market the college's programs and review each for equity in photographs, graphics, and language.
4. Observe your classrooms. Are your classrooms free of gender bias?
5. Read M. Keyes "My Worst Nightmare".
6. Review Title IX of the Education Amendment Act of 1972.
7. Graduate Placement Follow-up Report 92-93.

Evaluation

Select five (5) programs which you believe are traditional to men. What percentage of enrollees are men? women? Select five (5) programs which you believe are traditional to women. What percentage of enrollees are women? men? Using the Placement Follow up report, compare the earnings of graduates in each of these programs.

PART III - EQUITY

Module 2

Competency

- Recommend individual solutions to overcome personal bias and stereotypical behavior at work and in school.

Objectives

1. Identify personal biases. Trace biases to foundation for belief.
2. Define stereotypes, bias, and discrimination.
3. Define nontraditional.
4. Select what for you is an alternative (nontraditional for you) career possibility of interest to you.
5. Define women's work; men's work.

Learning Activities

1. Read materials provided with this module.
2. Compile a list of jobs associated with men; with women.
3. Quiz
4. Read "My Father Might Have Loved Me"

Evaluation

Be prepared to discuss and give examples as to how gender bias can be eliminated in the educational process. What does gender equity mean to you, to your friends, family? To other students in this program?

SexEquOu

Equity/Equality Training

Goals:

Students will be introduced to and become familiar with subjects

Objectives:

to recognize and understanddiversity; affirmative action legislation; sexual harassment and harassment; equity and equal opportunity

Learning Activities

presentation by instructor; visuals;; discussion; quiz

Evaluation:

written evaluation to be completed by the students at the end of instruction

Equity/Equality Training

1. The Changing World of Work

   Preparing for the future - **Workforce 2000**

   Understanding differences - **Statement of Values**

   Diversity and Affirmative Action - **Differences Between Cultural Diversity and Affirmative Action**

   Legal background for Affirmative Action/Knowing your rights and responsibilities - **handouts on harassment; Title VII; and the student complaint process**

2. Sexual Harassment

   What is it? - **booklet for distribution**

   What to do about it.

   Effects of on business and industry.

   Effects on the victim.

   (discussion among students - ask for examples.)

3. Stereotypes, Beliefs, and Equity

Quiz - **Myths and Facts**

Program Enrollments -

4. Conclusions

Goals and opportunities

The freedom to choose

5. Evaluation

Written by
Carolyn Meinhorter
FUTC
Summer 1993

Equity/Equality

Training

If the World were a Village of 1000 People...

The Old Farmer's Almanac 1992
by Donella Meadows
(edited by Roman Hidrogo)

If the world were a village of 1000 people, it would include:

584 Asians
124 Africans
95 East and West Europeans
84 Latin Americans
55 Former Soviets (Lithuanians, Latvians, Estonians, etc.)
52 North Americans
6 Austrailians and New Zealanders
1000

The people would have considerable difficulty communicating:

165 Mandarin
86 English
83 Hindu/Urdu
64 Spanish
58 Russian
37 Arabic
493 The rest speak Bengali, Portuguese, Indonesian, Japanese, German, French, and 200 other languages.

330 of the 1000 people in the village are children while only 60 of the 1000 are over the age of 65.

Of the 670 adults in the village, roughly half are illiterate.

There are seven teachers in the village.

WORKFORCE 2000

Workforce 2000 a statistical report compiled by the U.S. Department of Labor in 1989 has projected the following trends:

1. **By the year 2000 minorities, women and immigrants will comprise approximately 85 percent of the American workforce.**

2. **The highest rate of increase in the workforce will be Asian Americans and Hispanics.**

3. **White males will constitute approximately 15 percent of new entrants to the labor force.**

4. **Women will increase their representation in the workforce.**

5. **By the year 2000 the number of workers between the ages of 35 and 54 will increase.**

6. **Because of changing demographics, there is a serious potential for a labor shortage.**

7. **Corporations are facing a dilemma. Their pool of talented and committed workers is changing dramatically !**

WHY IS CULTURAL DIVERSITY EMERGING AS A WORKFORCE ISSUE?

Cultural Diversity is an emerging workforce issue. It became a workforce issue as a result of three important significant trends:

1. **THE GLOBAL MARKET IN WHICH AMERICAN CORPORATIONS MUST CONDUCT BUSINESS HAS AND WILL BECOME VERY COMPETITIVE.**

2. **THE AMERICAN WORKFORCE IS CHANGING AND IS BECOMING MORE DIVERSE.**

3. **INDIVIDUALS HAVE STARTED TO CELEBRATE THEIR DIFFERENCES AND HAVE BECOME LESS AMENABLE TO COMPROMISING WHAT MAKES THEM DIFFERENT.**

DIFFERENCES BETWEEN CULTURAL DIVERSITY AND AFFIRMATIVE ACTION

1. Cultural diversity means valuing cultural differences, i.e. race, age, religious, babyboomer, disability differences.

2. Affirmative action focuses on recruiting and retaining minorities and females and assumes these individuals will assimilate and adapt to fit in.

3. Affirmative action assumes that people who are different must bear the burden of adjusting.

4. Because of the limited scope of affirmative action efforts, women and minorities are disproportionately clustered at the bottom of the corporate pyramid. (THE GLASS CEILING PHENOMENON)

5. Affirmative action focuses too much on recruitment instead of problems related to retention and upward mobility.

6. Affirmative action was never intended to be a permanent tool. It was intended to fulfill a legal, moral and social responsibility be initiating "special efforts create a diverse workforce.

4. Cultural diversity requires managers to adjust to employee differences.

WHAT IS MANAGING DIVERSITY?

1. **Managing diversity is a "comprehensive managerial process for developing an environment that works for all employees" (Definition given by Dr. Roosevelt Thomas, Jr. in Beyond Race and Gender, 1991.**

2. **Managing diversity is a process that allows a company to develop steps for tapping the potential of all employees.**

3. **Managing diversity entails empowering employees.**

4. **Managing diversity includes all employees. It is not defined by race or gender. It also includes, lifestyle, gender, regional differences within an organization, exempt vs. non exempt status, and management vs. non management status.**

5. **Managing diversity means approaching diversity at three levels, *individual, interpersonal, and organizationally.***

6. **Managing diversity requires managers to spend more time enabling employees to perform their jobs. It is not about white males managing women and minorities. It is about all managers empowering employees.**

MAJOR CIVIL RIGHTS LAWS IMPACTING EMPLOYMENT

TITLE VII OF THE CIVIL RIGHTS ACT OF 1964 AND 1991

THE AMERICANS WITH DISABILITIES ACT

THE AGE DISCRIMINATION IN EMPLOYMENT ACT

THE EQUAL PAY ACT

VIETNAM VETERAN'S ACT

FAMILY MEDICAL LEAVE ACT

STATE AND FEDERAL SEXUAL HARASSMENT LAWS

VALUING DIFFERENCES INITIATIVES

FOSTER AWARENESS AND ACCEPTANCE OF INDIVIDUAL DIFFERENCES

FOSTER GREATER UNDERSTANDING OF THE NATURE AND DYNAMICS OF INDIVIDUAL DIFFERENCES

HELP EMPLOYEES UNDERSTAND THEIR OWN FEELINGS AND ATTITUDES ABOUT PEOPLE WHO ARE DIFFERENT

EXPLORE HOW DIFFERENCES CAN BE ASSETS IN THE WORKPLACE

ENHANCE WORKING RELATIONSHIPS BETWEEN PEOPLE WHO ARE DIFFERENT

STATEMENT OF VALUES

Among people, in terms of human desires, emotions and feelings, there is no difference.

In terms of beliefs, experiences and values, differences can be vast.

The way we get to know each other is through beliefs, experiences and values.

We usually choose to spend time with others whose beliefs, experiences or values mirror our own. This eliminates the rest of humanity and stops our education and acceptance of others who may be different.

If we choose to learn about any one of three facets (beliefs, experiences or values) that we do not agree with or know about, we begin to open ourselves to the possibility of accepting and valuing that person for their differences.

Acceptance of cultural differences diversifies our own experience, which may change our beliefs and broaden or change our values.

I cannot live your experiences, but I can change my own, by listening to yours.

FACTS ABOUT SEXUAL HARASSMENT

Sexual harassment is a form of sex discrimination that violates Title VII of the Civil Rights Act of 1964.

Unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute sexual harassment when submission to or rejection of this conduct explicitly or implicitly affects an individual's employment, unreasonably interferes with an individual's work performance or creates an intimidating, hostile or offensive work environment.

Sexual harassment can occur in a variety of circumstances, including but not limited to the following:

- The victim as well as the harasser may be a woman or a man. The victim does not have to be of the opposite sex.
- The harasser can be the victim's supervisor, an agent of the employer, a supervisor in another area, a co-worker, or a non-employee.
- The victim does not have to be the person harassed but could be anyone affected by the offensive conduct.
- Unlawful sexual harassment may occur without economic injury to or discharge of the victim.
- The harasser's conduct must be unwelcome.

It is in the victim's best interest to directly inform the harasser that the conduct is unwelcome and must stop. The victim should use any employer complaint mechanism or grievance system available.

When investigating allegations of sexual harassment, EEOC looks at the whole record: the circumstances, such as the nature of the sexual advances, and the context in which the alleged incidents occurred. A determination on the allegations is made from the facts on a case-by-case basis.

Prevention is the best tool to eliminate sexual harassment in the workplace. Employers are encouraged to take steps necessary to prevent sexual harassment from occurring. Employees should be informed of their rights, a complaint or grievance process should be established and immediate and appropriate action should be taken when an employee complains.

(over)

FILING A CHARGE

Charges of sexual harassment may be filed at any field office of the U.S. Equal Employment Opportunity Commission. Field offices are located in 50 cities throughout the United States and are listed in most local telephone directories under U.S. Government. Information on all EEOC-enforced laws may be obtained by calling toll free on 800-USA-EEOC. EEOC's toll free TDD number is 800-800-3302. For TDD calls from the Washington, D.C. Metropolitan Area, dial (202) 663-4494.

This fact sheet is available in the following formats: print, braille, large print, audiotape and electronic file on computer disk. For further information call the Office of Equal Employment Opportunity on (202) 663-4395 (voice), (202) 663-4399 (TDD) or FTS 989-4395 (voice), 989-4399 (TDD).

FACTS ABOUT THE AMERICANS WITH DISABILITIES ACT

Title I of the Americans with Disabilities Act of 1990, which takes effect July 26, 1992, prohibits private employers, state and local governments, employment agencies and labor unions from discriminating against qualified individuals with disabilities in job application procedures, hiring, firing, advancement, compensation, job training, and other terms, conditions and privileges of employment. An individual with a disability is a person who:

* Has a physical or mental impairment that substantially limits one or more major life activities;
* Has a record of such an impairment; or
* Is regarded as having such an impairment.

A qualified individual with a disability is an individual who, with or without reasonable accommodation, can perform the essential functions of the job in question. Reasonable accommodation may include, but is not limited to:

* Making existing facilities used by employees readily accessible to and usable by persons with disabilities;
* Job restructuring, modifying work schedules, reassignment to a vacant position;
* Acquiring or modifying equipment or devices; adjusting or modifying examinations, training materials, or policies; and providing qualified readers or interpreters.

An employer is required to make an accommodation to the known disability of a qualified applicant or employee if it would not impose an "undue hardship" on the operation of the employer's business. Undue hardship is defined as an action requiring significant difficulty or expense when considered in light of factors such as an employer's size, financial resources and the nature and structure of its operation.

An employer is not required to lower quality or production standards to make an accommodation, nor is an employer obligated to provide personal use items such as glasses or hearing aids.

MEDICAL EXAMINATIONS AND INQUIRIES

Employers may not ask job applicants about the existence, nature or severity of a disability. Applicants may be asked about their ability to perform specific job functions. A job offer may be conditioned on the results of a medical examination or inquiry, but only if the examination or inquiry is required for all entering employees in the job. Medical examinations or inquiries of employees must be job related and consistent with the employer's business needs.

(over)

DRUG AND ALCOHOL ABUSE

Employees and applicants currently engaging in the illegal use of drugs are not covered by the ADA, when an employer acts on the basis of such use. Tests for illegal drugs are not subject to the ADA's restrictions on medical examinations. Employers may hold illegal drug users and alcoholics to the same performance standards as other employees.

EEOC ENFORCEMENT OF THE ADA

The U.S. Equal Employment Opportunity Commission issued regulations to enforce the provisions of Title I of the ADA on July 26, 1991. The regulations take effect on July 26, 1992, and will cover employers with 25 or more employees. On July 26, 1994, employers with 15 or more employees will be covered.

FILING A CHARGE

Charges of employment discrimination on the basis of disability, based on actions occurring on or after July 26, 1992, may be filed at any field office of the U.S. Equal Employment Opportunity Commission. Field offices are located in 50 cities throughout the United States and are listed in most telephone directories under U.S. Government. Information on all EEOC-enforced laws may be obtained by calling toll free on 800-669-EEOC. EEOC's toll free TDD number is 800-800-3302.

If you have been discriminated against on the basis of disability, you are entitled to a remedy that will place you in the position you would have been in if the discrimination had never occurred. You may be entitled to hiring, promotion, reinstatement, back pay or other remuneration, or reasonable accommodation including reassignment. You may also be entitled to damages to compensate you for future pecuniary losses, mental anguish and inconvenience. Punitive damages may be available, as well, if an employer acted with malice or reckless indifference. You may also be entitled to attorney's fees.

This fact sheet is available in the following formats: print, braille, large print, audiotape and electronic file on computer disk. For further information call the Office of Equal Employment Opportunity on (202) 663-4395 (voice), (202) 663-4399 (TDD) or FTS 989-4395 (voice), 989-4399 (TDD).

January 1992

EEOC-FS/E-5

FACTS ABOUT PREGNANCY DISCRIMINATION

The Pregnancy Discrimination Act is an amendment to Title VII of the Civil Rights Act of 1964. Discrimination on the basis of pregnancy, childbirth or related medical conditions constitutes unlawful sex discrimination under Title VII. Women affected by pregnancy or related conditions must be treated in the same manner as other applicants or employees with similar abilities or limitations.

HIRING

An employer cannot refuse to hire a woman because of her pregnancy related condition as long as she is able to perform the major functions of the job. An employer cannot refuse to hire her because of its prejudices against pregnant workers or the prejudices of co-workers, clients or customers.

PREGNANCY AND MATERNITY LEAVE

An employer may not single out pregnancy related conditions for special procedures to determine an employee's ability to work. However, an employer may use any procedure used to screen other employees' ability to work. For example, if an employer requires its employees to submit a doctor's statement concerning their inability to work before granting leave or paying sick benefits, the employer may require employees affected by pregnancy related conditions to submit such statements.

If an employee is temporarily unable to perform her job due to pregnancy, the employer must treat her the same as any other temporarily disabled employee; for example, by providing modified tasks, alternative assignments, disability leave or leave without pay.

Pregnant employees must be permitted to work as long as they are able to perform their jobs. If an employee has been absent from work as a result of a pregnancy related condition and recovers, her employer may not require her to remain on leave until the baby's birth. An employer may not have a rule which prohibits an employee from returning to work for a predetermined length of time after childbirth.

Employers must hold open a job for a pregnancy related absence the same length of time jobs are held open for employees on sick or disability leave.

CHILD CARE

Leave for child care purposes is not covered by the Pregnancy Discrimination Act. However, Title VII requires that leave for child care purposes be granted on the same basis as leave granted to employees for other non-medical reasons, such as non job-related travel or education.

(over)

HEALTH INSURANCE

Any health insurance provided by an employer must cover expenses for pregnancy related conditions on the same basis as costs for other medical conditions. Health insurance for expenses arising from abortion is not required, except where the life of the mother is endangered.

Pregnancy related expenses should be reimbursed exactly as those incurred for other medical conditions, whether payment is on a fixed basis or a percentage of reasonable and customary charge basis. The amounts payable by the insurance provider can be limited only to the same extent as costs for other conditions. No additional, increased or larger deductible can be imposed.

If a health insurance plan excludes benefit payments for pre-existing conditions when the insured's coverage becomes effective, benefits can be denied for medical costs arising from an existing pregnancy. Employers must provide the same level of health benefits for spouses of male employees as they do for spouses of female employees.

FRINGE BENEFITS

Pregnancy related benefits cannot be limited to married employees. In an all-female workforce or job classification, benefits must be provided for pregnancy related conditions if benefits are provided for other medical conditions. If an employer provides any benefits to workers on leave, the employer must provide the same benefits for those on leave for pregnancy related conditions. Employees with pregnancy related disabilities must be treated the same as other temporarily disabled employees for accrual and crediting of seniority, vacation calculation, pay increases and temporary disability benefits.

FILING A CHARGE

The U.S. Equal Employment Opportunity Commission has issued guidelines, including questions and answers, interpreting the Pregnancy Discrimination Act (29 CFR 1604. 10). Charges of sexual discrimination may be filed at any field office of the U.S. Equal Employment Opportunity Commission. Field offices are located in 50 cities throughout the United States and are listed in most local telephone directories under U.S. Government. Information on all EEOC-enforced laws may be obtained by calling toll free on 800-669-EEOC. EEOC's toll free TDD number is 800-800-3302.

If you have been discriminated against on the basis of sex, you are entitled to a remedy that will place you in the position you would have been in if the discrimination had never occurred. You may be entitled to hiring, promotion, reinstatement, back pay or other remuneration. You may also be entitled to damages to compensate you for future pecuniary losses, mental anguish and inconvenience. Punitive damages may be available, as well, if an employer acted with malice or reckless indifference. You may also be entitled to attorney's fees.

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January 1992 EEOC-FS/E-2

Revised: 12/18/84

EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION POLICIES

INTRODUCTION

The following policies are intended to comply with all applicable state and federal laws, as well as express the District Board's commitment to the principles of equal opportunity for all.

A. **Legal Basis:** The District will seek continuous compliance with the following laws: Title VII of the 1964 Civil Rights Act, Age Discrimination in Employment Act, Title VI of the 1964 Civil Rights Act, Equal Pay Act, Title IX of the 1972 Education Amendments, Section 504 of the 1973 Rehabilitation Act, Wisconsin Fair Employment Law, (Wisconsin statutes 111.31-111.52), the 1976 Vocational Education Amendments and the Office of Civil Rights Guidelines for the Elimination of Discrimination in Vocational Education.

B. **Scope:** Equal opportunity, within the scope of these guidelines is for employees, applicants for employment, students, and the general public without regard to race, color, creed, national origin, ancestry, religion, sex, handicap, age, arrest record, conviction record, marital status, sexual orientation, or political affiliation. Retaliation is a form of discrimination, and as such is prohibited. The District Board recognizes that equal employment opportunity is a legal, social and economic necessity to the District.

   The District commits itself to a continuing program to assure that unlawful discrimination does not occur in the services it renders to the public. Those sectors of the public most affected by these policies shall be kept informed of their contents.

C. **Affirmative Action:** Affirmative Action will be taken to achieve a work force which includes an appropriate balance of racial/ethnic groups, women and the handicapped for all full and permanent part-time positions. The plan which outlines the details of this effort will be finalized December 31, 1984, and will be updated annually.

D. **Employment Practices:** It is the policy of the District not to discriminate against qualified applicants or employees. Fox Valley Technical College will comply fully with applicable Federal Equal Opportunity and Affirmative Action Laws, Executive Orders and Regulations and Wisconsin Laws including but not limited to Wisconsin Statutes 111.31-111.52. The policy of non-discrimination includes appropriate affirmative action to implement the goals of the policy.

   The principles and concepts of Affirmative Action will be integrated into all employment practices including, but not limited to, recruiting, hiring, transfers, promotions, training, compensation, benefits, layoff, terminations, retention, certification, testing and committee appointments.

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E. **Responsibility:** Ultimate responsibility for Affirmative Action rests with the District Director/President. Responsibility for implementing the Equal Opportunity and Affirmative Action Program rests with the District Affirmative Action Officer. However, managers and staff share responsibility for the success of the program, and performance evaluations shall include an affirmative action component.

F. **Harassment:** Harassment of and by employees and students on the basis of the above mentioned personal attributes is an illegal practice. Appropriate corrective measures will be used to eliminate harassment. An harassment policy is in place (Ref. Professional Staff Handbook, Chapter G - Personnel, Page GBAC.00001.)

G. **Grievance Procedure:** The Affirmative Action Grievance Procedure is utilized to process charges of discrimination which violate these policies. (Ref. Section GBAA, Administrative Policies and Procedures Manual, Vol. 6, FVTC Operating Guidelines.) Copies of this procedure can be obtained from the Affirmative Action Officer.

H. **Handicap Accommodations:** Reasonable accommodations will be provided for handicapped persons to ensure their access to employment and educational programs. The District provides physical accessibility to all learning and work stations.

I. **Religious Accommodations:** In response to an employee's request, reasonable accommodation will be provided for religious observances and practices.

J. **Vendors:** The District will seek assurance from all contractors and suppliers of products and services that they do not discriminate. The District Board also encourages the purchase of products and services from women, minority and handicapped business owners.

K. **Role of Affirmative Action Officer:** The District Affirmative Action Officer is responsible for developing and implementing the Affirmative Action Plan, and monitoring compliance. Responsibilities of the Officer include: developing a written Affirmative Action Plan, monitoring internal and external communication procedures, collecting and analyzing employment and student data, identifying problem areas, setting goals and timetables, developing and implementing programs to eliminate discriminatory practices, designing and implementing an internal monitoring system, and submitting compliance plans and reports to the Wisconsin Board Affirmative Action Officer.

Violation of this policy or the Affirmative Action Plan will result in appropriate corrective action.

Contact Person: The Affirmative Action Officer reports to the District Director/President to assure implementation of the Affirmative Action Plan. Questions regarding affirmative action or equal opportunity shall be directed to: Affirmative Action Officer, P.O. Box 2277, 1825 North Bluemound Drive, Appleton, WI 54913. Telephone (414) 735-5677

Date_____Signature_____
District Director/President

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Approved: 3/19/91

STUDENT DISCRIMINATION/HARASSMENT COMPLAINT POLICY

This policy is designed to comply with Wisconsin law prohibiting discrimination against students. (Section 38.23, Wis. Stats.) To comply with this policy, a procedure is available for complaints by students concerning alleged discrimination or harassment as those terms are described below.

The Affirmative Action Officer of the Fox Valley Technical College (FVTC) has primary responsibility for implementing the institution's discrimination complaint policy and procedure.

The Affirmative Action Office serves as central intake point for all internal complaints of discrimination and/or harassment. All charges of discrimination and/or harassment may be investigated by the Affirmative Action Office, however, complaints by represented employees at FVTC may be referred for processing through the nondiscrimination grievance procedure outlined in the applicable collective bargaining agreement, and complaints against a student may be referred for processing pursuant to the Procedures Governing Disciplinary Code of Conduct.

Definitions

1. "Discrimination" shall mean a difference in treatment in any service, program, course or facility of FVTC on the basis of race, color, creed, religion, sex, national origin, disability, ancestry, age, sexual orientation, pregnancy, marital status or parental status.

2. "Harassment" shall mean the use of aspersions, insults or slurs or other verbal or physical conduct which:

   a. Has the purpose or effect of creating an intimidating, hostile, or offensive academic or employment environment;

   b. Has the purpose or effect of unreasonable interference with an individual's academic or employment performance;

   c. Otherwise adversely affects an individual's academic or employment progress.

   The term "harassment" will encompass "sexual harassment," which means unwelcome sexual advances, unwelcome physical contact of a sexual nature, unwelcome request for sexual favors, and other verbal or physical conduct of a sexual nature (including, but not limited to, the deliberate, repeated making of unsolicited gestures or comments, or the deliberate or repeated display of offensive, sexually graphic materials, which is not necessary for educational purposes). When:

   a. Submission to such conduct is made either explicitly or implicitly a term or condition of an individual's status as a student;
   b. Submission to or rejection of such conduct by an individual is used as a basis for enrollment, rating, or grading of a student;

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c.- Such conduct has the purpose or effect of substantially interfering with an individual's academic progress, or creating an intimidating, hostile, or offensive academic environment.

3. "Probable cause" means reasonable grounds sufficient to justify a prudent person to believe, in light of all the relevant facts and circumstances, that discrimination or harassment has occurred. (A finding of probable cause does not mean that discrimination, in fact, took place.)

Complaint Procedure

The complaint procedure consists of four distinct steps: (1) Complaint Intake, (2) Complaint Investigation, (3) Review and Findings, and (4) Complaint Resolution. Each stage of the procedure and its components will be discussed.

1. COMPLAINT INTAKE

Any applicant, student, staff member, administrator, or citizen requesting services from FVTC who has experienced or observed alleged discrimination at FVTC may file a complaint with the Affirmative Action Officer. The complaint should be in writing and detail the facts and circumstances which are the basis for the complaint and identify the individual(s), policy, procedure or practice at FVTC responsible for the alleged discrimination or harassment. When the complaint is filed, the Affirmative Action Officer will interview the person filing the complaint and will provide them with a copy of this complaint procedure and information on the prohibitions against retaliation for filing of a complaint. In accordance with Wisconsin law, a complaint alleging discrimination must be filed within 300 days of the alleged violation with the President (who may refer it to the Affirmative Action Office).

2. COMPLAINT INVESTIGATION

The Affirmative Action Officer will request any additional information required from the complainant. In addition, any persons identified as witnesses who are teachers, students, staff, supervisors, administrators or others employed by the District will be contacted, as appropriate. The Affirmative Action Officer may conduct the investigation directly or may refer to or work with other FVTC offices to conduct the investigation. Any individual specifically alleged to be responsible for the complaint of discrimination or harassment will be offered an opportunity to respond to the complaint verbally and/or in writing. The investigation will begin within thirty (30) days of receipt of the complaint and should, if practical, be concluded within 60 days of receipt of the complaint.

3. REVIEW AND FINDINGS

Once the investigation is completed, the information gathered, and written statements submitted will be reviewed and all evidence will be considered to determine whether there is probable cause to believe the complainant has been subject to unlawful discrimination or harassment, or FVTC policies and procedures have been violated. When the review is completed, a memo summarizing the findings resulting from the investigation will be prepared. Written findings should, if practical, be issued within 15 days of conclusion of the investigation.

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4. COMPLAINT RESOLUTION

If the findings show that there is no probable cause to believe that discrimination or harassment occurred, the Affirmative Action Office will dismiss the complaint and will notify the complainant, and any individuals specifically alleged to be responsible for discrimination or harassment who had previously been notified of the complaint, of the dismissal.

If the findings indicate that there is probable cause to believe that unlawful discrimination or harassment may have occurred, the Affirmative Action Officer will make efforts to resolve the dispute through conciliation and consensus. If a resolution is achieved through the conciliation process, a letter of recommendation and resolution will be prepared to confirm the resolution and describe any corrective action determined appropriate to resolve the finding of possible discrimination or harassment. Letters of recommendation and resolution shall be designed to correct problems, relieve adverse impact, and meet the needs of the institution, its faculty, staff, administrators and students. Letters of recommendation and resolution will be implemented promptly by the responsible administrator.

If the findings indicate that there is probable cause to believe that unlawful discrimination or harassment may have occurred and a resolution has not been achieved through the conciliation process, the Affirmative Action Officer will refer the matter to the appropriate FVTC department. If the potential discrimination is the result of violation of FVTC regulations, policies or procedures by an FVTC employee, the matter will be referred to the Wisconsin Education Association Council (WEAC) or the appropriate dean for review and appropriate action under the disciplinary procedures of those offices. If potential discrimination or harassment is found to be the result of violation of FVTC regulations, policies or procedures by a student, the matter will be referred to the Dean of Student Services for review and appropriate action pursuant to the Student Disciplinary Code of Conduct. In either case, the employee or student whose conduct is being referred for review will be notified of the referral.

5. APPEAL

Employees or students referred for disciplinary action or sanction will be entitled to the applicable appeal process under the applicable collective bargaining agreement or the Procedures Governing Non-Represented Employee Appeal Process as appropriate. In accordance with state law, a student complainant may appeal the resolution of a complaint alleging discrimination to the District Board by filing a written request for appeal within seven days of the date of the Letter of Dismissal or Notice of Referral for review by the Vice President of Human Resources. The request for appeal must be in writing and contain a statement explaining in detail why the student contests the resolution and include copies of any documents that will substantiate or clarify the appeal request. The District Board will, if practical, consider the request for appeal at its next regularly scheduled meeting (but not sooner than 30 days or later than 60 days from receipt of the request for appeal, with the exception of the month of August when the Board is in recess) and may deny the appeal, overturn

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the original decision, or remand the matter for partial or complete review, citing specific matters to be considered. The disposition by the District Board is final and there shall be no further appeal of the matter.

ASSURANCE OF NONRETALIATION

Retaliatory action against anyone filing a complaint of any type of discrimination, including sexual harassment, is strictly prohibited. The complainant and the respondent will be advised of the district's policy in this regard when filing a complaint.

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Beliefs About Women

Myths and Facts

Answer the following questions with True or False.

____ 1. It is harmless to harass women verbally or to simply pinch or pat them; women who object have no sense of humor.

____ 2. Sexual harassment is actually quite rare.

____ 3. Women who work at jobs away from home are trying to be men.

____ 4. The percentage of women who work outside the home is increasing since World War II.

____ 5. At last women earn comparable wages compared to men.

____ 6. When women work outside the home, they generally stop taking care of household chores.

____ 7. More than 50% of mothers of school-aged children work away from home.

____ 8. In general, marriage has a positive effect on women's mental health.

____ 9. Most psychiatric patients are women.

____ 10. Wife-abuse occurs in approximately 1% of marriages.

____ 11. Men who were physically abused as children react differently than women who were abused.

____ 12. Eating disorders like anorexia and bulimia are common in both men and women.

____ 13. "Penis Envy" means women want to have a penis.

____ 14. In the first few years of life, children gain a permanent sense of identity as either male or female.

____ 15. Children of working mothers have more problems.

____ 16. With the new laws, child support is rarely a problem.

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Answers

1. **False.** Sexual harassment is any unwanted sexual attention ranging from leering, pinching, and verbal comments to rape. There is an implicit message from the harasser that noncompliance will lead to reprisals: it is threatening and degrading to the women.
2. **False.** 88% of 9,000 respondents in a 1976 Redbook survey reported unwanted sexual advances on the job.
3. **False.** Most women who work do so out of financial necessity. In a 1979 survey, 16 million women (out of 42 million in the general work force) were supporting themselves alone or were the sole support for their family.
4. **True.** In 1950, women composed 29% of the work force. In 1978, they were 41% of the work force.
5. **False.** In 1955, the average women earned 64% of the average man's income. In 1985, the average woman earned 64% of the average man's income.
6. **False.** In a 1974 survey, the average working woman spent 26 hours per week on household chores plus 5-10% more for each child.
7. **True.** In fact, nearly half the nation's mothers with children under age <u>one</u> are in the work force.
8. **False.** In a 1973 study, rates of emotional disturbance were higher among married women than single women. However, marriage has a beneficial effect for men.
9. **True.** 75% of psychiatric patients are women. Rates of depression are higher for married women and highest for women with young children at home.
10. **False.** Between 1975-1985, 16% of couples had at least one violent incident per year. Of these incidents, one-half were considered severe (beating or threatening to use a weapon).
11. **True.** Men tend to act violent toward others, whereas women direct aggression against themselves.
12. **False.** Eating disorders are increasingly common and are much more common in women. For example, 95% of anorexics are women. Theories include society pressure on women to be thin, and pressure on women to achieve for others rather than for themselves.
13. **False.** This means women want to have the things men have, like power; it does not mean they actually want to be men.
14. **True.** By age 3, gender identity is firmly established.
15. **False.** A recent study showed that children of working mothers tend to do better at school, with fewer days absent and have better communication skills.
16. **False.** Nearly 24% of the nearly 4 million women with court-awarded support did not receive a penny in 1983. In the year following divorce, the standard of living for women with minor children decreased 75%; for the father, it increased 42%.

CRITICAL INCIDENTS

Here are some examples of situations a person might (and does) encounter in a different culture. While most of them have a "right" answer, the value in using them is in the discussions they provoke. Get material for additional ones from anecdotes in the travel literature, in books on doing business abroad, or newspapers. (It may surprise you to know The Wall Street Journal runs articles with a "cultural awareness" slant almost every day.)

1. You are in a country in which you have been warned about drinking untreated water. You are thirsty and your host brings you a glass of water.

a) You tell your host you're really not thirsty after all.
b) You ask your host if the water has been boiled.
c) You refuse politely and ask for bottled water or a soft drink or tea.
d) You thank your host and drink, teeth closed, hoping to strain out harmful bacteria.
(Adapted from V. Lynn Tyler, Intercultural Interacting [Provo, UT, 1987].)

2. Anyone who has been in a developing country knows that many people beg for money on the street. When I was in India, my Indian colleagues warned me not to give money to beggars because they were supposedly part of organized begging rings. Away from tourist areas, however, beggars seemed genuinely in need. What would you do--give money or not? Why? [A discussion on this issue can range from a debate about social welfare systems to considerations of "the value of human life."]

3. It is difficult enough for a man to do business in a traditional society; women must be prepared to adapt even more. Lennie Copeland and Louis Griggs tell, in Going International, of a woman vice president of an American firm who headed a delegation to Saudi Arabia. When invited to one of the Saudi's homes for dinner, she was escorted into a separate room where the women ate. Which of the following answers would balance the interests of all: the woman executive, the members of the Saudi culture, and the American firm?

a) She should never have gone on the trip in the first place, given the extremely traditional nature of Saudi society.
b) When she got the dinner invitation, she should have refused for herself, but allowed the men in her delegation to go, but with instructions not to make any commitments.
c) At the Saudi's home, when she realized what was going on, she should have joined the men.
d) She should have complied with the Saudi custom and ate with the women.

4. Dan Johnson was assigned to an Indonesian oil field site. He had learned some bihasa Indonesia, the national language. When he did speak it, the Indonesians would usually giggle and then answer him in English, even if they only knew a few words. Often when Dan was trying to explain a complex drilling procedure, the people, in a smiling manner, would encourage him to speak English. However, even when Dan was confident that his use of bihasa was correct, people would laugh, grin, and nod their head. This left Dan confused as to whether people were really understanding him. Which of the following explanations can be best justified?

a) The Indonesians wanted to practice their English as much as Dan wanted to speak bihasa, and so were trying to make use of the opportunity with Dan.
b) The people simply did not understand Dan's attempts at speaking their language; their laughter was a sign of embarrassment.
c) The people perceived that Dan was more comfortable using English, and so encouraged him to do so with characteristic Indonesian politeness and considerateness.
d) The people were reacting to a strange sight--an American using their language--by giggling to cover their surprise and awkwardness, but were also pleased at his efforts.

Some Teaching Tips

1. Using the model of the "ideal" worker, have students generate attributes of the "ideal" student. (They will have no trouble doing this, since all have been bombarded for years with commands and advice.) Then, ask how many fit this description. Discuss the consequences of treating all students as if they were alike and the costs of lowered productivity, morale, retention, etc. Relate to their profession or their workplace and broaden discussion to cultural diversity.

2. Recognize that intercultural sensitivity develops by stages, and that acceptance follows only after stages such as denial (not being aware of cultural differences), defensive behavior (negative stereotyping toward other cultures and an assumption of cultural superiority because of perceived threats), and minimization ("Oh, people are basically alike"). Attempts to promote acceptance of cultural differences before these stages have been worked through may be counter-productive.

3. In a marketing context, get students to either imagine or role play themselves as a member of another culture or of the opposite gender. What advertisements or marketing strategies would they be expected to react to in their new body, especially if marketers use stereotyped images?

4. In any context in which some kind of theory about human behavior is used, whether it be in health care, marketing, tourism, or police science, ask whether this theory can be applied universally, or whether it applies only to a segment of the population (rich vs. poor, men vs. women, straights vs. gays, white vs. non-white). Theories can be as culture-bound as any other element of a culture.

5. Use examples of "critical incidents" in an international context (included) to stimulate discussion.

Benefits of Diversity

For Self

Gain an increasing understanding of self and others and develop different and new approaches to communication.

Recognize similarities as well as differences and the gains that can be obtained from this combination.

Recognize your own responses to change.

Become more flexible in your reactions to diversity.

Increase awareness and sensitivity to different perspectives, outlooks and circumstances that motivate people to act and think in various ways.

Help us gain a better understanding of our own cultural practices, biases, strengths and weaknesses.

Increases cultural competency and cross-cultural communication skills.

Teach others about diversity.

In The Workplace

Understanding diverse learning and working styles helps maximize opportunities for success and productivity.

Identifying and acknowledging the assets that diverse populations bring to the workplace helps improves teamwork.

Recognizing and celebrating the above assets empower people.

Reduce tensions and frustrations in the workplace by understanding changes and various modalities of interaction.

Improves morale and respect among employees.

Fosters creative thinking and improves problem solving.

Respond better to employees' needs.

Employees' contributions towards company tend to increase.

Seeing diversity in ourselves and others as an asset is freeing and enriching. Potential and hidden talent gets released.

Companies generally show an increase in sales and diverse markets.

Helps us identify points of conflict and address them to enhance rather than to impede progress in the workplace.

Creates environment in which people are valued as individuals, diverse viewpoints are supported and potential is fully used.